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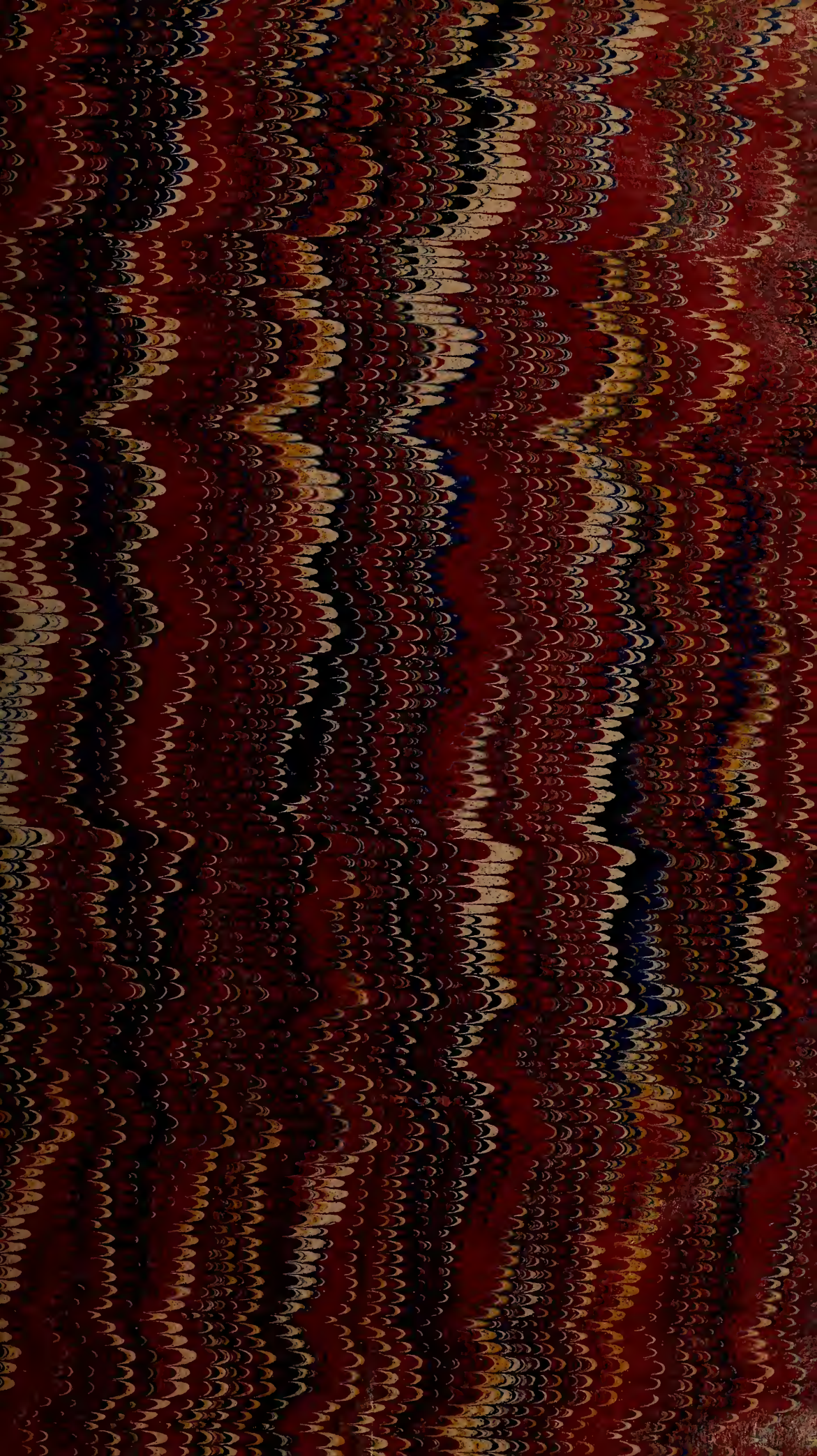
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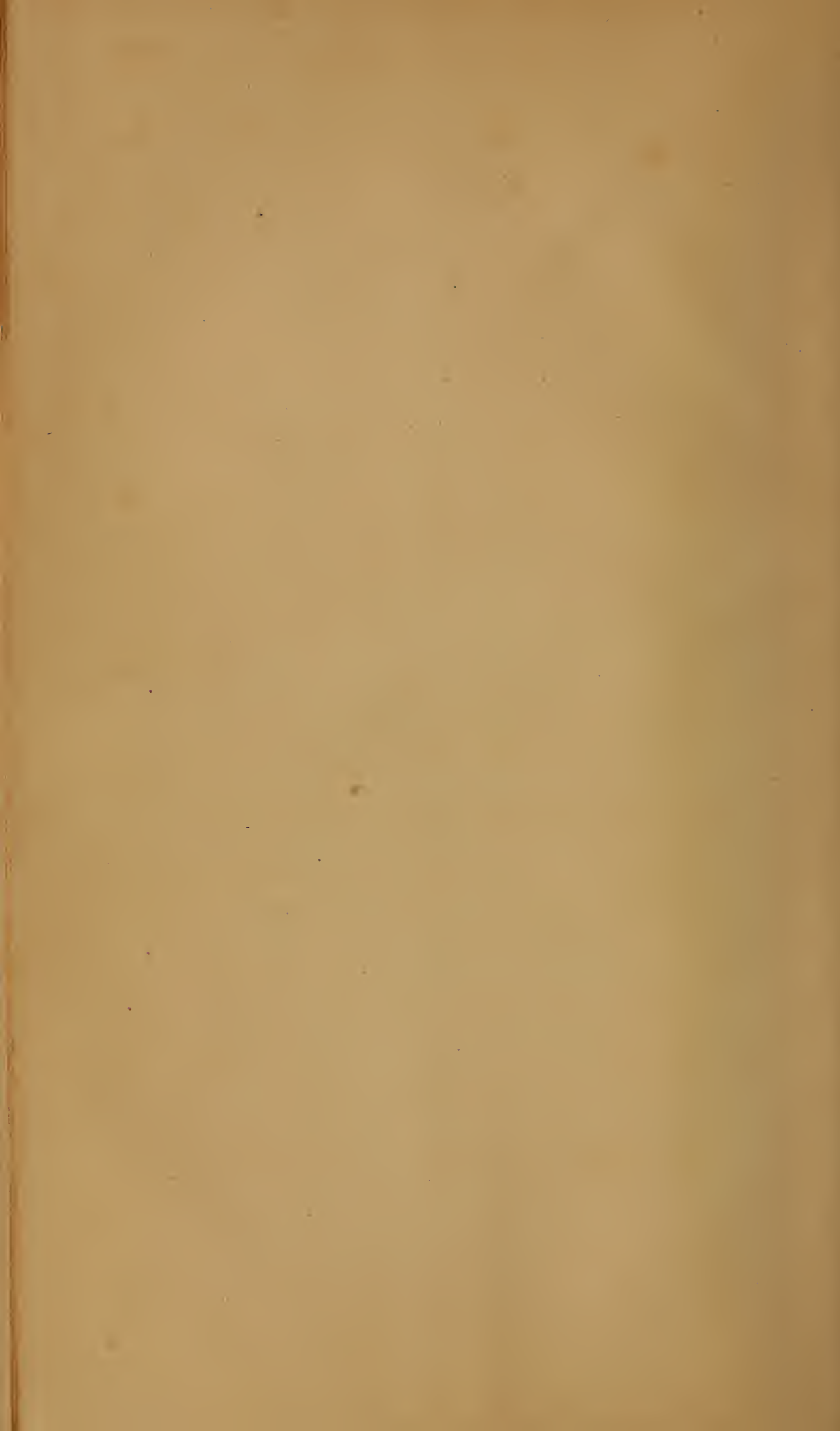








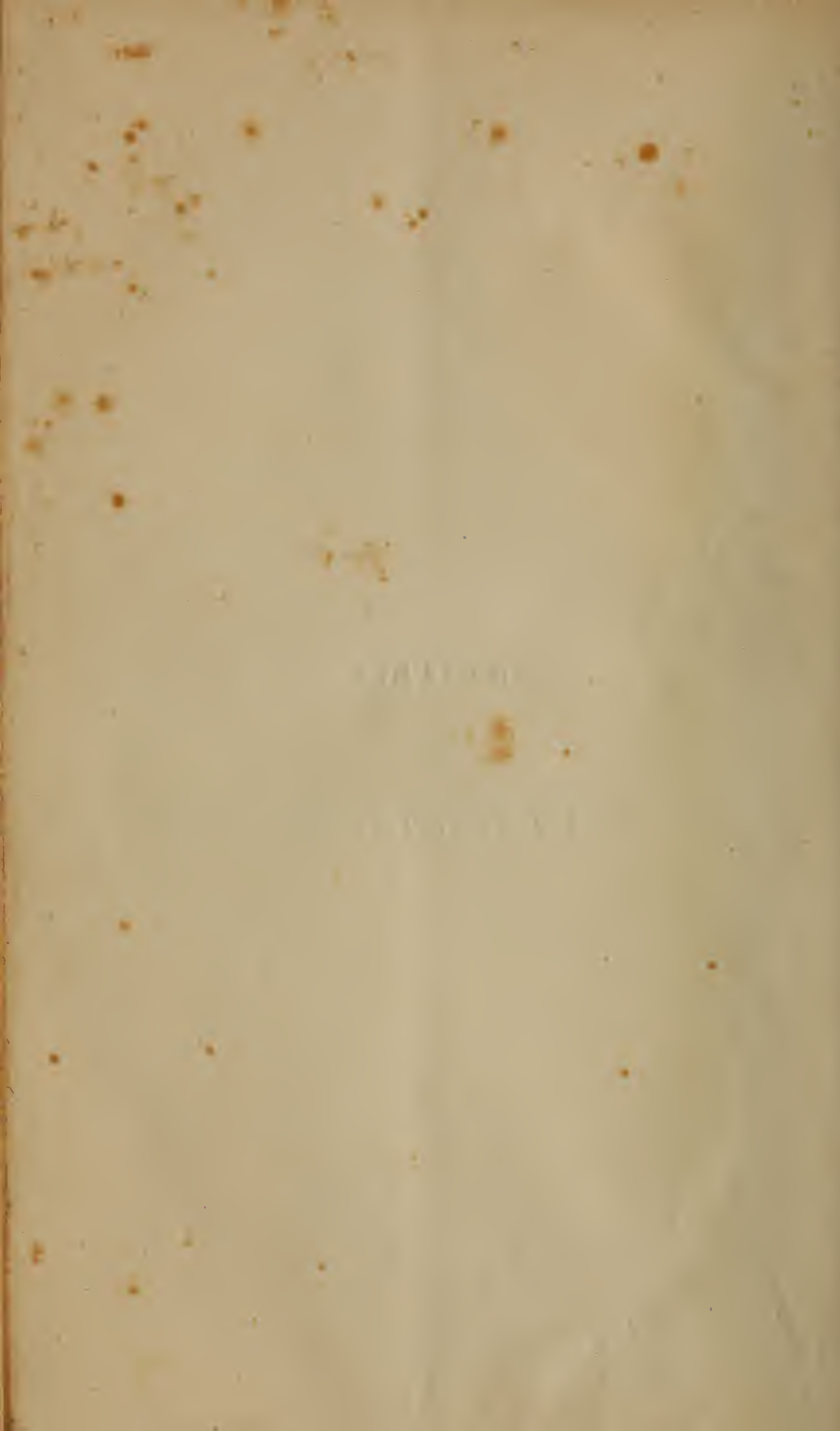






LECTURES  
ON  
LITHOTOMY.

54



LECTURES  
ON  
L I T H O T O M Y,

DELIVERED AT

THE NEW-YORK HOSPITAL,

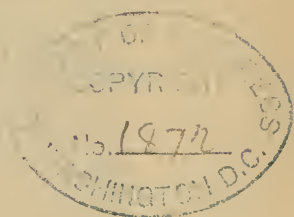
DECEMBER, 1837.

BY

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NEW-YORK:

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1838.



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## LECTURE I.

### ON LITHOTOMY.

**THE** human bladder, protected in front by the bones of the pubes, has been opened in every other imaginable direction for the extraction of calculi from its cavity : superiorly in the median line above the pubes in the high operation ; posteriorly through the rectum with and without division of the anus, or before the rectum in the median line, either behind or through the prostate ; inferiorly through the perinæum by the side of the prostate, without dividing either that gland or the urethra ; and lastly through the urethra and prostate. Entertaining, in common with the great majority of surgeons who have lived since the time of Cheselden, the conviction that the best modes of lithotomy involve a division of the urethra and prostate, I shall confine my observations to these alone ; for such is the extent of this subject, that a description, however brief, of the various plans for cutting, distending, and tearing the bladder, would occupy the time allotted to many lectures.

### OF THE LATERAL OPERATION.

The lateral, or, as it is called by the French,

the lateralized operation is now almost exclusively practised. The essential part of this operation is, that upon a grooved staff, previously introduced into the bladder and held firmly, the urethra is laid open anteriorly to the prostate gland, which is next divided in a direction downwards and towards the left side. This most important section is made with a knife having a sharp point and convex edge, according to the last mode of Cheselden ; with a long knife concealed in a sheath, and so introduced, then opened so as to cut as it is withdrawn, in the operation of Frère Côme ; with a long straight or curved bistoury, having a beak to slide along the groove of the staff, according to the plan of Blizard and Sir A. Cooper ; and lastly, with instruments which make an opening through the prostate and neck of the bladder, either by cutting or stretching, or tearing ; or by a combination of these results, after the method of Hawkins, Cline, and others ; the whole being done during the entrance of the instrument and not, as in the former method, during the withdrawal of it.

#### STATISTICAL RESULTS OF THE OPERATION.

Pouteau has estimated the fatal results of operations for stone at 1 in 40. Bichat at 1 in 6, 8, and 9. Cheselden at 1 in 10½. Douglass, Cheselden, and Middleton, at 1 in 6 in the high opera-



tion combined with incision in perinæo. Mr. Civiale estimates the mortality as nearly 1 in 4; Sir A. Cooper at 1 in 7 or 8; and this last is probably a just estimate; some of the other statements are evidently wanting in accuracy, or are derived from limited observation. "I have collected," says Dupuytren "during ten years, as well in the public as in the private practice of the most distinguished men of Paris and its environs, all the cases of operation for stone that have come to my knowledge; and have collated all these cases, observed in individuals differing in age, sex, and in temperament, operated on by various methods; in seasons, in places, and in conditions so often opposite; and I am convinced that between a fifth and a sixth perish in the mass of these who are operated on for stone."\*

\* *A TABLE, prepared by Dupuytren, showing the result of 356 Operations for Stone, practised in Paris, or within its environs, in the space of ten years.*

SEX.	No. of operations.	Periods of Life.	Death.	Cures.	Approximate proportion between the number of deaths and Cures.	
Male.	97	fr. 3 to 15 years.	9	88	1 in 11	9 in 100
	59	15 " 30	8	51	1 in 7	13½ " "
	45	30 " 50	10	35	1 b. 45	22 " "
	74	50 " 70	18	56	1 in 4	24 " "
	37	70 " 90	11	26	1 b. 34	29½ " "
Female.	7	3 to 15	0	7	0 in 0	0 in 100
	11	15 " 50	1	10	1 in 11	9 " "
	17	50 " 70	2	15	1 b. 8 & 9	12 " "
	9	70 " 90	2	7	1 b. 3 & 4	22 " "
Total.	356	3 to 90	61	295	1 in 6	17 in 100
Male.	312	3 to 90	56	256	1 b. 5 & 6	18 in 100
Female.	44	3 to 90	5	39	1 in 9	11½ in 100

Individual operators have published results far more successful than those here given. Thus Mr. Martineau of Norwich, England, has published a table, showing eighty-four successful operations to two deaths. It is to be observed that a large proportion of his patients were boys, and some of them females, and that he encountered but two large stones. One of these cases proved fatal. Mr. Martineau operates with the knife after the manner of Cheselden.

My friend Dr. Dudley states that of one hundred and fifty-three operations he has performed, only four have proved unsuccessful. This result places him first in the list of successful lithotomists. He uses the gorget of Cline — a flat, single winged instrument cutting on one side — and he never enlarges the opening by a second incision. It will be remembered that neither Mr. Martineau nor Dr. Dudley practised in crowded cities. No one can read the reports and dissections of the fatal cases in London and Paris, without being convinced that some of the mortality is owing to causes foreign to the mode in which the operation is performed. Candour obliges me to make this concession; justice to you, among whom are so many who have visited or will visit the hospitals of the great capitals of Europe, obliges me to add, that this

operation is often done too much with a view to effect, with a rapidity unnecessarily hazardous, and upon patients either not duly prepared before the operation, or cared for suitably after it. Still I consider the lateral operation as essentially defective and unnecessarily hazardous.

#### OF THE CAUSES OF DEATH AFTER THE OPERATION.

“About three-fifths,” says Dupuytren, “die of inflammation; the most frequent seat of which is the bladder, the cellular tissue of the pelvis, the rectum, the peritonæum, the kidneys, the lungs, the pleura, or the liver.”

“About one fourth die of hemorrhage, or the means used to arrest it; of the rest some perish from accidental or concomitant diseases: as verminous affections, measles, convulsions, small-pox, disorders of the digestive system, rheumatism, catarrhs, &c.”

Without sufficient personal experience to offer an opinion on the these most interesting and important statistical statements, I would yet remark that too little stress appears to me to be laid upon those complications of affections of the kidneys,



which are found upon dissection to co-exist with stone in the bladder, and render operations improper and fatal; and secondly, that no mention is made of those nervous symptoms, the sinking and prostration, from which it is not unusual for patients to perish; and finally, nothing is said of phlebitis, or of diffuse inflammation, depending either upon infection, or a disordered state of the constitution.

In post mortem examinations we find, according to Dupuytren, the neck of the bladder, and the left half of the prostate gland, freely and smoothly divided by the cutting instrument as far as the cellular tissue which surrounds the bas fond, and the lateral portions of the bladder; and we see inflammation of this tissue spreading to all the soft parts within the pelvis, the rectum, and the peritonæum. In other cases the neck of the bladder and the left half of the prostate are found scarcely divided by the incision, but exhibiting a wound of which the lips are contused, torn, stretched, and the surface soft and gangrenous. In this case, also, the inflammation extends into the pelvis, to the rectum, and to the peritonæum; but from different causes.

The *bladder itself may become inflamed* by being pinched, stretched, bruised, or lacerated with the

forceps. This instrument, passed between the bladder and rectum, may seize the stone between the coats of the bladder ; or the posterior wall alone of the bladder may be embraced by the instrument.

The cellular tissue of the *rectum may become inflamed* from the violence done to it ; or its mucous membrane may be inflamed by the contact of urine arising from an opening through the gut.

*Inflammation of the kidneys*, may be transmitted from the bladder along the ureters ; it may occur without continuity of inflammation, or in consequence of calculi in them, or of other pre-existing organic diseases.

Like all other great operations, lithotomy may be followed by fatal *phlebitis, inflammation of distant organs* previously diseased or otherwise.\*

#### OBJECTIONS TO THE LATERAL OPERATION.

Some of the objections to the lateral operation are common to all, and some are peculiar to each of the several modes in which it is performed ; some are derived from the accidents which occur

\* See an able paper on Phlebitis by Dr. Jno. Watson, in the American Journal of Medical Sciences, for November, 1837.

after this method ; some from reasoning founded upon anatomical and pathological examinations of the parts interested.

The opening made in the lateral operation of lithotomy is not so situated as to afford the easiest and most direct exit to stones, and renders impossible the extraction of those of unusual magnitude. It is too near the lower border of the symphysis pubis, and too near the descending ramus of the left os pubis. Setting aside the insufficiency of the opening through the prostate itself; that body, and the neck of the bladder, in the efforts of withdrawing a stone must be pressed downwards, and over to the right side. The effect of this is first to tear the fascia, which unites the anterior surface of the neck of the bladder to the posterior surface of the pubes; and afterwards, when the parts return to their natural situation, the track of the wound not being direct, the exit of urine may be prevented, and infiltration ensue.

If to make the incision large, the operator commences it very far forward, he will divide the artery of the bulb, otherwise called the deep transverse perinæal. If fearing to wound the rectum, he cuts it too horizontally, he will divide the deep seated transverse perinæal near its origin.

If, on the other hand, he carries it more backward, he approaches and may wound the rectum; and cutting in any direction beyond the limits of the prostate gland, he divides the deep perinæal fascia, and incurs the danger of urinary infiltration.

Large incisions cause inflammation ; because by extending beyond the limits of the prostate and the neck of the bladder, they allow the urine to come in contact with the cellular tissue of the pelvis ; either below or above the pelvic fascia, or third fascia of the perinæum, and in contact with the peritonæum. Either inflammation destroys, by spreading extensively and rapidly, or, as in the case of matter forming under a fascia, by causing a gradually enlarging abscess.

“Small incisions, on the contrary, cause inflammation by the difficulties they present to the introduction of instruments, and to the extraction of the stone, by reason of which, the track of the wound is torn, stretched, and contused.”\* The track of the wound is so often stretched, bruised, and torn, without producing fatal effects, or apparently any bad consequences of moment, that these results are, in part, susceptible of a different explanation: the lateral and backward displace-

\* Dupuytren, *Memoire sur une Nouvelle Maniere*, &c.



ment of the prostate, causing a stretching, or tearing of the cellular tissue between the bladder and pubes ; a very natural, and to some extent, a necessary result of the lateral operation in which the incision is made on one side of the gland exclusively, and near the symphysis and descending ramus of the pubes ; or it may arise from the unskilfulness of the operator in passing the forceps not into the bladder, but one or both blades behind that viscus, and tearing the cellular tissue which connects it with the rectum. The free passage of urine over the surface of a wound does not materially impede its healing ; but where it is injected into the cellular tissue, as we see in urinary infiltrations, it is one of the most irritating fluids in the animal economy.

In considering the lateral operation, the first thing to be attended to is, then, the volume of the stone ; success or failure depends upon it. “If the foreign body never exceeded three inches in its smaller circumference, so that the incision in the prostate might be limited to three quarters of an inch, or a few lines more ; the operation when well performed, would seldom or never be followed by fatal consequences. When it measures four inches and a half in its lesser circumference, or when the sum of its two lesser diameters amounts to three inches, the patient may recover, but the

chances are very much against him ; and when it exceeds this volume, death is almost sure to be the result of the operation.

The surgeon is in this dilemma : he must either use force, or make a long incision ; the former lacerates the prostate and cellular tissue, bruises the bladder, and stretches its membranes, and shocks the nervous system ; the latter prepares the way for infiltration of urine : both are fatal nearly to the same degree.”\*

That these dangers may most generally be avoided, by adapting the length and direction of the incisions to the particular conformation of the perinæum, as regards the degree of divergence of the bones forming the lower strait of the pelvis, the depth of the perinæum, the condition of the rectum, and the magnitude of the prostate gland, and the presumed size of the stone, I am ready to admit.

On the other hand, it is known that the most skilful operators have cut parts which should be avoided ; and for the want of proper incisions, have employed unnecessary violence, and finally have sometimes failed in extracting stones not of a mag-

\* See King's Treatise on the stone, page 104.

nitude to render their safe extraction impracticable.

CASE I.—A medical friend, whose statement is implicitly to be relied on, informed me that he examined, after death, a man operated on with Hawkins' gorget, by a surgeon of great celebrity as a successful lithotomist, and who had been unable to remove the stone on account of its size. The incision was properly made, and the calculus proved to be of the size and shape of a hen's egg; and not proportionably so large as one I removed from a boy by the bilateral section.

CASE II.—In the first operation I ever performed, the calculus was extracted with so much difficulty, although the prostate was divided by a second incision on the right side, that the patient narrowly escaped death from inflammation of the parts injured.

CASE III.—A lad about eleven years old, after suffering two years, with symptoms of stone in the bladder, underwent the lateral operation, which was performed in the usual manner with the scalpel, and blunt bistoury. The last incision was made in a direction outwards and downwards, with one sweep of the knife, and *very free; no*



*urine flowed through the wound, until the forceps was introduced.* The stone which was about the size of an almond, was readily extracted, and the patient bore the operation well. The loss of blood did not exceed two or three ounces.

Six hours after the operation, the boy being in a state of great pain, twenty-five drops of laudanum were given to him. Second day, rested pretty well during the night; little, or no urine passed through the wound. He complains of a good deal of pain, when pressure is made over the region of the bladder; warm fomentations were applied. At one o'clock, twenty leeches over the hypogastric region, and an injection composed of senna,  $\text{ʒ i.}$  sulph. magnes.  $\text{ʒ i.}$  warm water, Oi.— At 7, P. M., six ounces of blood were taken from the arm. The injection not having operated, another with the addition of tincture of aloes was given. At 9, P. M., the injection, not yet operating, was repeated; patient very restless; abdomen very tender to the touch; no urine through the wound since last evening; an attempt was unsuccessfully made to pass a bongie through the wound into the bladder; an instrument was finally introduced through the penis, and half a pint of urine mixed with purulent matter was drawn off. Another injection was given, and the bowels were freely evacuated.



Pulse now 140; respiration short and hurried; skin hot and dry. Have tart. ant. gr.  $\frac{1}{5}$  every two hours. Third day, restless all night; pulse not so quick or tense as yesterday; tongue furred; skin hot and dry; abdomen very tender to the touch; passed half a pint of urine this morning. At 3, P. M. — Twenty leeches to abdomen, and submuriate of mercury gr. v. internally. — At 8, P. M., much worse; respiration hurried; pulse rapid; skin hot and dry; submuriate of mercury, gr. v. repeated, and an enema as before. At 3 o'clock in the morning, sixty-three hours after the operation, the patient expired. No post mortem examination was obtained.

Such occurrences are more common than mere reading would lead you to suppose; for they are not like successful operations blazoned forth in the literature of the day. But although comparatively safe in the case of stones of moderate dimensions, not exceeding three inches in their smallest circumference, for those of large size the lateral operation offers no resource — cut which way you will, no incision or incisions made in this method, can give exit, without dangerous laceration and contusion, to a calculus, whose smallest circumference, when grasped with a forceps, is more than

six inches in the adult, and proportionally less in young patients.

In this case, the symptoms indicated infiltration of urine; the cut was extensive, and the course of the incision not direct. When no urine follows the last incision, if the bladder is reached at all, it must be by reason of the want of parallelism of the external and internal incisions. Here then, was just the combination of circumstances calculated to produce urinary infiltration — an extensive cut, and a tortuous wound. The incision opened the pelvic fascia; the obstruction to the exit of the urine by the wound, caused it to be pressed by the contraction of the bladder into the cellular tissue behind that aponeurosis. Would the infiltration have been prevented by passing a catheter into the wound after the operation? Without positive facts to settle this question decisively, I would express the following as the best opinion I have been able to form on these points. If the rectum has not been separated from the posterior surface of the bladder, by poking the finger or forceps there; or if wounds have not been made at the side of the rectum, by rough handling, the introduction of the catheter into the wound will prevent infiltration; otherwise there is danger, even with that precaution; but not certain fatality. It is not

bruising the track of the wound so much, as making pouches by the side of it, that leads to fatal results. A valvular wound, and incisions as extensive as can be made, without wounding important parts, are inseparable incidents of the lateral operation.

These considerations, united with the actual result of operations for the stone, in all the various modifications of the lateral operation, seem fully to warrant a trial of a new method, if one can be devised.

#### OF THE VARIOUS MODES OF PERFORMING THE LATERAL OPERATION.

I have had some experience in the lateral operation, having performed it fourteen times in male subjects; although, as many of you here know, (having been my early pupils, and practising near me since I have been in practice,) every one has ultimately got well, and entirely so; yet I have always felt that the operation was not so perfect as it should be. Under this impression, I have tried almost every variety of instrument; the gorget, the scalpel, the beaked bistoury, the bistouri caché of Frère Côme; and I have seen all these used in this country, and in England and



France. The advantages and disadvantages of the beaked bistoury and the gorget, are set forth in most treatises on lithotomy, and in the systematic works on surgery. In the lateral operation, the preference of one or other of these instruments is more or less a matter of taste, about which no one should dispute. But as regards the bistouri cachè of Frère Côme, I consider it a dangerous instrument; liable to wound the fundus of the bladder, and by no means necessarily making, in the withdrawal of it, the definite incision claimed as one of its advantages. The incision must be larger or smaller, not only according to the graduation of the instrument, but according as it is withdrawn straight, or pushed to one side or the other; or as its handle is elevated or depressed. The knife of Langenbeck, and the straight staff of Mr. Key, appear to me very awkward instruments: after one trial of each of them, I fully resolved not to employ either of them again. The blunt bistoury seems to me a very convenient instrument; but considering that the incision of the prostate is to be made with one sweep of the knife, it must happen that this incision is more or less extensive than the operator may desire, according as that gland is harder or softer, or larger or smaller. The desideratum is to make an incision of a definite



extent ; this object is not precisely attained by the bistoury.\*

The following observations of Mr. Stanley appear to be a fair statement of the case.

“An exclusive preference is not to be given to the gorget, or to the knife for the incision of the prostate. With either instrument, skilfully used, the operation may be well done. With a gorget,

\* Professor Dudley gives these opinions :

“The constant variety in the depth of the perineum in successive patients who present themselves for the operation, added to the variable condition of the neck of the bladder and prostate gland, including the enlarged, and the indurated, or the relaxed and diminished state of this organ, tends very much to expose these parts to be unnecessarily and dangerously wounded, when the scalpel is selected with a view to open the bladder. A sweep of the knife, the extremity of which is made to perform an arc of a circle in the bladder, with a force applied sufficient to carry it through a space precisely suited to one patient, might with similar force be quite too extensive for a second, and of insufficient dimensions in a third.”

“In using the scalpels of the different surgeons, the incision is made after entering the bladder, by means of a lateral movement of the hand, and consequently more to the hazard of the patient, inasmuch as it is subject to all the casualties arising from different degrees of resistance in the parts to be divided from their remoteness from the surface, from their size, from the length, and breadth of the blade of the scalpel, and from the manner of holding it. Who would pretend to accuracy in a piece of dissection carried on in parts, to reach which, the instruments are passed through an obscure medium?”

“Let the prostate gland be enlarged or of its natural size, indurated or broken down, inflamed or healthy, the incision made by the gorget cannot vary in extent or position.” — *On Calculous Diseases*.

properly constructed, there is no risk of wounding the internal pudic artery or the rectum, because the limits of the incision are determined by the dimension and form of the instrument. With a knife, in an inexperienced hand, there is not so much certainty of confining the incision within its proper limits.

“A comparison of the gorget with the knife, so far as instituted, is favourable to the former ; but to the narrow bladed and beaked knife, first used by Mr. Blizzard, an advantage belongs, which a gorget, from the width of its blade, cannot possess. The knife enters the bladder, as Mr. Blizzard was accustomed to remark, as easily as a probe. The gorget, on the other hand, must meet resistance in passing through the prostate ; very much less, however, will this resistance be, than it has been usually represented, when the gorget has been properly made, and it is guided with skill.”

For the young subject, or for a thin adult, the knife is especially suited. It is also to be preferred for any case in which the bladder is closely contracted upon the stone. But for a very fat, or for an old subject, in whom, by the enlargement of the prostate, or the dilatation of the rectum, the bladder is raised much above its natural situation, the gorget is better adapted, on account of the

great distance from the perinæum, at which the prostate and neck of the bladder are in such instance situated.

#### HEMORRHAGE.

CASE IV. — The following case occurred to me at the New-York Hospital, in the year 1823. I cut a healthy man, 24 years old, with the single cutting gorget; the stone was of very moderate size, and was removed very expeditiously; little blood flowed. Three hours after the operation, he became pale, and his skin was bathed with sweat, and his bladder distended; then followed severe straining; attended with great pain, and ending in a discharge of a globular mass of coagulated blood. These symptoms recurred at various intervals, generally about once in two or three hours, for four or five days; attempts having been made in vain to arrest the bleeding by introducing a cylinder of lint into the wound; the bleeding appeared to come from the upper end of the wound; it ceased on the 7th day. The left leg afterwards became enlarged, as in phlegmasia dolens; five weeks after the operation, three pints of matter were discharged from an abscess in the leg, and from this time he gradually recovered. It was probably phlebitis induced by the pressure of the tampon.



## URINARY INFILTRATION.

CASE V. — Protot Francois, aged 22 years, of a good constitution, and sanguineous temperament, had been subject to derangement in the urinary apparatus for fifteen years, and had frequently passed small calculi by the urethra. On the 15th of April, 1822, he entered the Hotel Dieu, complaining of the usual symptoms of stone in the bladder; he suffered excessively in voiding his urine, which contained no blood, but a great deal of mucus. A spare diet, and baths were ordered. On the 12th, the patient was sounded, and the stone recognized. On the 15th, the operation was performed according to the plan of Frère Côme. Incisions were first made through the soft parts of the perinæum, up to the membranous portion of urethra; this canal was then opened to admit the sheathed knife, which was passed into the bladder, opened, and withdrawn unsheathed, so as to divide the prostate to the extent of a little more than an inch. The stone which appeared to be very large, was extracted with great difficulty; after several attempts to remove it, which lasted eight or ten minutes, its external layers gave way, and were crushed; it was then withdrawn without further violence. As several of the fragments escaped from the forceps, a few minutes were occupied in clear-



ing and washing out the bladder. The patient was carefully put to bed, and an antispasmodic tisan was ordered. He passed the day tolerably well, although he seemed much depressed; towards evening some uneasiness was felt at the lower part of the abdomen; it seemed, however, to be occasioned by the passage of gas in the intestines. On the 17th, there came on vomiting with increasing uneasiness in the abdomen. Forty leeches were applied to the abdomen, and diluent drinks were given plentifully. There was some abatement in the symptoms in the night; but no distinct remission. On the 18th, twenty more leeches were applied to the abdomen, and twenty to the perinæum. The patient was also placed in a bath. On the 19th, the vomiting had disappeared; but the features were much changed, the pulse was wiry, the skin hot and dry, the tongue somewhat parched. More leeches, purgatives, bath, and fomentations were had recourse to, but without effect; the patient died on the 21st.

*Necropsy*, the parts in the vicinity of the wound were macerated in a brown, purulent fluid. The whole of the cellular tissue of the pelvis was infiltrated with thick pus; this infiltration extended into the lumbar regions, and filled the iliac fossæ.

The peritonæum presented to the extent, corres-

ponding to the suppuration beneath it, abundant pseudo-membranous productions, uniting the small intestines to one another, and to the bladder. The other parts of the body were healthy; the tissue of the kidneys seemed, however, to contain a little more black blood than usual.

#### SINKING IN A BAD CONSTITUTION.

CASE VI. — The patient was 67 years old, thin and feeble. Mr. Lawrence extracted a large calculus by the lateral operation; the patient lost in the ten or twelve ounces of blood. Nothing is said of any further hemorrhage. “After the patient had been removed from the table, two qrs. of crude opium were administered, when he soon dropped off in a sound sleep. On waking, he complained of slight thirst, but said he felt no pain. His pulse being feeble, some wine and water was given. His pulse continued weak, his muscles tremulous, and he could speak only in a whisper; his tongue was always dry, with a brown streak in the middle;”\* he died on the third day. Patients of this class can only survive an operation by previously improving their health, and making the operation without hemorrhage pain or infiltration.

\* Medical Gazette, Vol. 5, page 160.

## OF THE ANATOMY OF THE PARTS.

Before I explain to you the methods of performing the Celsian or bilateral operation, I shall offer a description, with diagrams, of the anatomy of the parts concerned in it.

The surface of the lower strait of the pelvis, bounded by two lines which extend from the symphysis pubis to the tuberosities of the ischia, and from these to the point of the coccyx, represents a rhombus of which the longest diameter extended from the symphysis to the point of the coccyx, corresponds to the rapha. A straight line drawn from one tuberosity to the other across the inferior strait of the pelvis, divides this space into two perfectly equal triangles. In the male, the anus is constantly placed at the point where these two lines cross each other; in the female, it is not the anus, but the orifice of the vagina which is found at this point. The anterior of the two triangles into which the perinæum is thus divided, is the narrow space within which the lithotomist has to confine his incisions. The portion of it selected for the celsian operation, is still more limited. It may be exactly circumscribed by a crescent stretching from one tuber ischii to the other, and passing to the level of the bulb of the urethra; that



is to say, at nine or ten lines from the anus. Thus its transverse length is equal to the distance which separates the ischia, its greatest length from before backwards upon the median line is nine or ten lines, and this regularly decreases as we approach the ischia.

A section of the pelvis made in the median line, from the pubes towards the sacrum, and upon an adult subject, submitted to congelation, presents above the space here described a triangular surface, the base of which formed by the rapha, is nine or ten lines long; the apex, situated at the point where the membranous part of the urethra meets the rectum, is crowned by the prostate, which from this point is elevated upon its inferior angle, to pass on to embrace the neck of the bladder. The anterior side of this triangle, formed by the urethra, is twelve or thirteen lines long: the posterior border, formed by the rectum, is not more than eleven or twelve lines in length. These two borders, both form salient lines, encroaching upon the area of the triangle, which they bound in front and rear, and thus contract the space we are describing. The salient line which exists upon the anterior border, is at first formed by the bulb of the urethra; afterwards by the membranous portion of this canal which offers a regular and



constant curvature ; but which, in consequence of variations in the volume, or of the projection or length of the bulb, is more or less carried backwards, and consequently more or less difficult to reach in the operation for stone. The salient border which exists posteriorly is formed by the anterior and inferior part of the rectum. According as the rectum is empty or full, contracted or relaxed, it advances more or less upon the sides of the prostate and towards the membranous part of the urethra, and thus it becomes more or less liable to be wounded in the operation.

Immediately beneath the skin of the perinæum, we find,

1st. The superficial fascia.

2d. In the middle line, the anterior portion of the external sphincter ani, formed by the elliptical fibres divided into two layers ; of which the external is attached to the superficial fascia, while the other dips down at the rapha, and becomes confounded with the muscles of the bulb, and is continuous with the deeper seated fascia. It results from this connexion that the external sphincter cannot contract without rendering tense the perinæum, and drawing back the bulb of the urethra.

3d. Under the external sphincter is found a mass of fat filling up the intervals between the more important parts.

4th. Below this mass we find a fibrous fascia which, after surrounding the lower part of the rectum, passes between the sphincter and acceleratores urinæ; adheres to the ischia, and loses itself in the superficial fascia of the thigh after investing the scrotum and uniting to the dartos. It forms the first series of membranes placed at the inferior strait of the pelvis, destined to support the viscera, aid the action of the muscles, and give consistence to the parts. To this membrane most of the fibres of the external sphincter are attached. This muscle cannot contract unless the fascia is kept tense and drawn back.

5th. Beneath this membrane we find more fatty matter; some branches of vessels running from without inwards, and from behind forward.

6th. Beneath this cellular tissue we come to a second fibrous membrane, which envelopes the root of the corpora cavernosa, the erector penis, the accelerator urinæ, the bulb and the canal of the urethra, and forms a sheath to the vessels on the side of the penis. As this fascia, like the

preceding is inserted into the edge of the ischia, they may be considered as two layers of one membrane, which as it leaves the bones divides itself into layers to surround the parts we have described.

7th. In the medna line, the *acceleratores urinæ*, united and confounded together posteriorly, embrace the inferior and lateral surface of the bulb and spungy part of the urethra. The posterior part of these muscles is united to the sphincter and *transversales perinæi* to form with them a very strong fibrous and muscular centre, situated at the part of the urethra, which it is necessary to cut upon in the operation of lithotomy. Their anterior part separates and covers on each side a muscular and membranous plane which extends outwards and terminates on the *corpora cavernosa*.

8th. At the sides, the *erectores penis* extend from the internal surface of the tuberosities of the ischia to the middle of the *corpora cavernosa*, which they envelope as the *acceleratores urinæ* do the urethra. The distance between the origins of these muscles is about two inches across the *perinæum*.

9th. Somewhat more deeply, the transversales muscles are seen situated at the posterior part of the perinæum, between the erectores penis and the acceleratores urinæ, and at the base of the triangular space between these muscles. The transversales muscles are divided in the lateral operation, and also by a straight transverse incision ; but incisions which commence opposite the membranous part of the urethra and extend outwards and backwards leave them untouched.

10th. The union of the acceleratores and transversales is opposite the commencement of the membranous part of the urethra, which can only be reached by dividing deeply and largely this hard consistent mass.

11th. In the muscular plane of the perinæum we find the superficial arteries arising from the internal pudic opposite the tuberosities of the ischia, ascending in a direction forward, upward and inward along the ascending ramus of the ischia, and gradually approaching the median line to go to the dartos, and inferior part of the body of the penis.

12th. More deeply seated beyond the middle aponeurosis and the acceleratores urinæ, we find the deep seated transverse artery, or the artery of



the bulb; this arises from the internal pudic sometimes with the common trunk of the last described artery; it is usually given off at the junction of the ischium and pubis whence it runs forward, upward and inward, gradually increasing its distance from the pubes and approaching the bulb. It is always situated from an inch and an eighth to an inch and a half from the anus; it reaches the bulb rather less than an inch from its posterior extremity, and anastomoses in its substance with the vessel of the opposite side, or without anastomosing it divides into branches going to the bulb, and to the spongy portion of the urethra.

13th. More outwardly are seen the internal pudic arteries, which coming off from the internal iliac, leave the pelvis through the ischiatic notch, whence they run up close to the internal side of the ischium in the direction of the ascending branch of this bone, and the descending branch of the os pubis until they approach the symphysis and furnish the arteries of the corpora cavernosa and dorsum penis. The distance between the trunks of these vessels at the posterior part is two inches; in front it becomes gradually less.

14th. Some branches of hemorrhoidal vessels are seen at the sides and base of the triangle

which we have described ; but these will not be divided by an incision made an inch in front of the anus in the centre and not passing beyond it posteriorly and laterally.

15th. The skin, cellular tissue, membrane and muscles, especially the acceleratores urine, being removed, we see the bulb of the urethra forming a slight projection, never more than a few lines in extent. It is liable to be cut during the operation, unless the incision is made very near the anus. But dividing the bulb at this point is of little moment ; its vessel being small, arising from the transversales perinæi. These last vessels and their larger anterior are not liable to be injured, unless the incisions are made too near the scrotum, and too far from the anus.

16th. Beyond the bulb we find fatty matter filling the space comprised between the bulb and the membranous portion of the urethra. This tissue contains several small branches of the inferior hemorrhoidal arteries, coming from the internal pudic.

17th. Above the bulb in the median line we find the membranous portion of the urethra embraced and capped on its nearest extremity by the bulb,

and received at the other extremity into the point of the prostate : its length varies from four and five to eight and even nine lines. Its diameter scarcely exceeds a line and a half or two lines, when the urethra is empty ; its parieties are scarcely half a line in thickness. It reposes inferiorly upon the rectum, from which it is only separated by a thin layer of cellular tissue ; it is covered by an expansion of the transverse perinæal muscles, and is composed of an internal or mucous membrane, and an external coat of a fibrous and elastic nature. According to almost all the modes of operating below the pubes, this is the part selected for penetrating into the neck and body of the bladder, avoiding on the one hand the bulb, and on the other the rectum. The extensibility of this part of the urethra, permits it to be instantaneously expended by the staff, from one line to three or four lines in diameter. By the aid of some efforts and the successive introduction of sounds of increasing size, it may be increased to five lines ; but beyond this, the narities of the canal, too much distended, give way, and allow the urine to become extravasated.

18th. The prostate placed at the summit of the space just described, is flat from before backwards and of a triangular figure ; its base directed up-



wards and backwards, is a little grooved towards its middle, receiving and embracing the neck of the bladder; its summit directed downwards, is in relation with the membranous portion. Upon its sides is cellular tissue enclosing veins and arteries of moderate size; upon its anterior surface we find cellular tissue and the pudic vessels diminished as they approach each other under the symphysis pubis. Its posterior surface rests upon the rectum to which it is intimately united. Its breadth at the base, measured from side to side, is from twenty to twenty-four lines, and decreases gradually towards its summit. Its thickness, a little greater at the sides than on the median line, is from ten to twelve lines. The portion of the urethra within the cavity of the prostate, receives in its posterior surface the caput galinaginis, the seminal ducts, and those of the prostate. The right and left sides of the prostate, form two symmetrical lobes, each of which is ten or twelve lines broad; measured from the urethra towards the pubes anteriorly, it is only three or four lines in thickness; posteriorly, or from the urethra towards the rectum, it is seven or eight lines. An incision of the anterior part of the prostatic portion of the urethra would almost immediately divide the venous plexus, the extremities of the pudic arteries and the cellular tissue behind the pubes. An incision of the posterior



part of the prostate would divide one of the seminal ducts, and soon reach the rectum. Lastly, a transverse incision of the right or left lobe of ten or twelve lines in extent, would divide the cellular tissue of the pelvis: it therefore follows, that incisions of greater extent than this cannot be made within the limits of this organ, except in a transverse direction *on both sides at the same time*. This bilateral division gives an opening of from twenty to twenty-four lines in extent, without going beyond the limits of the prostate or dividing parts which should not be cut.

19th. The neck of the bladder is the opening by which the urinary calculi are reached in almost all modes of operating for the stone below the pubes.

20th. Superiorly next the pelvis and peritonæum the perinæum is strengthened by fibrous and muscular strata analogous to those of the external surface of this region below the integuments. In fact, beyond the above described parts, are the superior aponeurosis and the levator ani muscles. The two laminæ of the superior aponeurosis arising from the edge of the pelvis pass conjointly with the levator ani; which they enclose from above downwards, and from without inwards towards the median line. They embrace the rectum, the neck

of the bladder and prostate, and separate the pelvic from the perinæal portions of these organs. In front, the two laminae of this aponeurosis approach each other, and passing from the pelvis backwards form the anterior ligament of the bladder. Posteriorly where they are strongest, they are intimately united to the rectum and coccyx.

We thus see that the perinæum contains three distinct aponeurotic chambers; the highest lies between the peritonæum and the superior aponeurosis, and is a receptacle for extensive and deep seated abscesses next to the peritonæum. The second cavity situated between the superior and middle aponeurosis forms like the preceding, a receptacle for the products of inflammation which sometimes pass on the sides of the rectum towards the margin of the anus, and sometimes finding the resistance of the inferior aponeurosis too great, extend to the cellular tissue of the scrotum, and even to the inguinal region, forming large abscesses. The third plane is superficial and rests upon the integuments inferiorly.

#### ADVANTAGES OF THE BILATERAL OPERATION.

In the region between the anus and the bulb, the bladder may be reached with great facility, by an in-

cision extending on both sides of the median line either straight or curved so as to be concentric with the anus. This route to the neck of the bladder is direct, and shorter than any other ; it gives an incision almost absolutely free from hemorrhage, and of greater extent with safety ; for the prostate is cut upon both sides, thus rendering less necessary any laceration of this gland, or any extension of the incisions beyond its proper limits. It is less liable than any other to urinary infiltration ; first, because it is direct ; secondly, because it does not transcend the limits of the prostate. It is less liable to injury of the rectum, because the incisions are carried more nearly parallel to that viscus. Finally, for the preceding reasons, and because it requires less violence in the extraction of the stone, it is less liable to be followed by inflammation.

The opening made in this operation being opposite the largest diameter of the inferior strait of the pelvis, and the route to the bladder, as above stated, being the shortest and most direct, it follows that larger stones may be extracted through it, than by any other method, with equal safety and without crushing them. The operation is more easily performed ; the incisions are made with more facility ; and there is a certainty almost



perfect of cutting those parts which should be cut, and those alone. The introduction of the forceps and the final manipulations for examining with the finger the size and situation of the stone, are as easy as the structure of the parts will allow, and more easy than in the lateralized or any other operation. Thus the bruising of the parts, and especially the laceration of the cellular tissue, between the bladder and rectum, by the slipping of the gorget, or the introduction of the forceps, are either avoided or rendered as inconsiderable as the nature of the case will admit.

#### THE CELSIAN OPERATION.

The bilateral operation has been performed in at least three, if not four, different modes. These I shall successively speak of, and offer some reflections on each.

The Celsian method, (though probably Celsus never performed this or any other operation, being only a compiler,) or as it has been termed in modern times, cutting upon the gripe, is even at this day, the method practised in modern Greece, as I am credibly informed by a native of that country. Singularly enough, the description of the operation given by Celsus, although scarcely



admitting a double interpretation, has been misunderstood and misapplied by some of the earlier modern surgeons.\*

\* The following passages are extracted from Celsus. In the first paragraph the portion in Italics settles conclusively the much mooted point as to the meaning of the term *coxas* in the last passage here quoted.

#### MODE OF SECURING THE PATIENT FOR THE OPERATION.

Homo prævalens et peritus in sedili alto consedit, supinumque eum et aversum, *super genua sua coxis ejus collocatis*, comprehendit; reductisque ejus cruribus, ipsum quoque jubet, manibus ad suos poplites datis, eos, quam maxime possit, attrahere; simulque ipse sic eos continet.

#### MODE OF SEEKING FOR THE STONE IN THE BLADDER.

Medicus deinde, diligenter unguibus circumcisis, atque sinistra manu, duos ejus, digitos, indicem et medium, leniter prius unum, deinde alterum in anum ejus demittit; dextræque digitos super anum abdomen leniter imponit; ne, si utrinque digiti circa calculum vehementer concurrerint, vesicam lædant. Neque vero festinanter in hac re, ut in plerisque, agendum est; sed ita, ut quam maxime id tuto fiat: nam læsa vesica nervorum distentiones cum periculo mortis excitat. Ac primum circa cervicem quæritur calculus; ubi repertus, minore negotio expellitur.

#### MODE OF SECURING THE STONE.

Ergo ultra calculum dextra semper manus ejus opponitur; sinistræ digiti deorsum eum compellunt, donec ad cervicem pervenit. In quam si oblongus est, sic compellendus est, ut pronus exeat; si planus, sic, ut transversus sit; si quadratus, ut duobus angulis sedeat; si altera parte plenior, sic, ut prius ea, qua tenuior sit, evadet. In rotundo nihil interesse, ex ipsa figura patet; nisi, si lævior altera parte est, ut ea antecedit.

#### MODE OF MAKING THE CUT.

Cum jam eo veni incidit super vesicæ cervicem juxta anum cutis plaga lunata usque ad cervicem vesicæ debet, cornibus ad coxas spectantibus paulum; deinde ea parte qua resima plaga est, etiamnum sub cute altera transversa plaga facienda est, qua cervix aperiatur; donec urinæ iter pateat, sic ut plaga paulo major, quam calculus sit.

In the second volume of Bromfield's Surgery, page 366, we meet with the following passage. "Heister, in his books of surgery, has given a plate, in order to explain the method of performing the operation of lithotomy, as described by Celsus. I own I was not a little surprised when I examined it, as it was so extremely different from the idea I had formed of his intentions: I therefore immediately had recourse to Celsus' works, and found the delineation in Heister's surgery, so very foreign to Celsus' account, that I was induced to perform the operation on a dead subject, according to the directions given by him, as I understood them."

The annexed plate is copied from Bromfield.\* It will be found to correspond perfectly with the language of Celsus,—the proper interpretation of which undoubtedly is, that a curved incision is made in front of the anus upon the stone pressed towards the wounded portion of the perinæum. Bromfield appears to have been the first who correctly interpreted the text of Celsus. More recently, in France, Chaussier, Beclard, M. Ribes, and Dupuytren, have construed it in the same way.

Bromfield, in performing the operation upon the

\* See plate 1.

dead subject after the Celsian method, extracted the stone through the prostatic portion of the urethra without dividing it. Some weeks afterwards the gentleman who examined the parts for him, an eminent anatomist, repeated the operation on a subject nine years old, and found that the wound in the bladder had been made under the orifice of the urethra, and being made transversely, both ducts of the vesiculæ seminales were divided. The result of this trial seems to have discouraged Bromfield and his friend. Had he employed the grooved staff perhaps the result would have been different.

Whether Raw, (who probably cut more persons for the stone than any other surgeon that ever lived,) made the Celsian incision upon the grooved staff or not, is uncertain. The use of the grooved staff was common in Raw's time, and is not mentioned by Celsus. Raw kept his method secret though he operated publicly. His only answer when questioned was, "Read Celsus. Read Celsus."

It is hardly necessary to dwell upon the imperfections of this method in adults. The finger is scarcely long enough to hook the calculus. It might indeed be held by a curved instrument, but the



pressure of the stone against the neck of the bladder with the degree of force necessary to fix it, must certainly be attended with danger. Lastly, there is an uncertainty as to the parts which are cut.

The great defect of the Celsian operation is the want of a staff, — its peculiar advantage is that it extends on both sides of the median line. The rectum deviates so little from the middle line, that for all practical purposes the parts may be considered symmetrical. By the use of the staff, unknown to the ancients, the bilateral incision may be horizontal, passing transversely across the perinæum immediately behind the bulb; or horizontal on one side of the rapha and curved downwards on the other; or lunated, or oblique, passing from the right to the left side of the rapha and from before backwards; or sigmoid, with its central part crossing the rapha.\*

And these incisions may preserve their form until the prostate and neck of the bladder are divided. I am not aware that any of these incisions, except the transverse and lunated, have been attempted; but so far as reason and anatomy can

\* See plate.



decide, any of these methods may be followed with almost equal safety.

If it be objected that the lips of the wound, wanting the support of an undivided portion of prostate, will not come in apposition so as to heal kindly, my answer is, that in the lateral operation, when stones of unusual magnitude have been met with, the prostate on the right side has been cut in various directions, and no ill consequence has followed; and moreover, in the bilateral operation, in which the double incision is made an essential part, the healing of the wound is not less rapid than where that gland is divided on one side only.

Dupuytren thus describes his operation :

“Let the patient be placed and secured in the same way as for the lateral operation.

“Then having with the staff ascertained the presence and probable size of the stone, the surgeon ought to give it a vertical direction, its shaft making a right angle with the axis of the body; and its curvature being rather elevated under the concavity of the symphysis than supported at its lower and back part on the side of the rectum. A skilful assistant ought to maintain it steadily in

this position. Armed with a double cutting scalpel, the surgeon makes in the perinæum a curved incision, transverse, embracing the anus within its concavity. The skin, the elastic subcutaneous cellular tissue, the superficial perinæal aponeurosis, the anterior part of the external sphincter, and the posterior part of the bulb of the urethra should be successively divided in the same direction, until we are able to feel distinctly the catheter and its groove.

“During this part of the operation we should not lose sight of the direction of the urethra and its relations with the intestine. The instrument should carefully avoid the anterior convexity of the intestine, and follow the course of a line that should extend from the anus to the anterior surface of the bladder and hypogastrium. If these precautions are neglected the rectum will be wounded. The lower surface of the urethra should be divided with the point of a bistouri directed against the groove of the catheter to the extent of three or four lines. It is important that the point of the bistouri should rest in the groove of the staff so as to avoid the possibility of denuding or cutting the rectum, which in this place is in almost direct contact with the prostate and urethra.

The nail of the left index finger kept in the wound, should be introduced into the furrow of the catheter to serve as a guide to the lithotome, the blunt extremity of which, penetrates without effort, along the incision already made. It is then necessary to direct the convexity of the curve of the instrument at its lower part from the side of the rectum, so that its concavity, lying upon the catheter in the proper direction, it may be more easily directed onwards as far as the bladder. The immediate contact of the two metallic bodies, announces that the lithotome is properly placed; and the surgeon, seizing the staff with the left hand, so as to lift it towards the symphysis pubis, and to push its beak deeper into the bladder, the beak of the lithotome is pushed along the groove of the staff.

“The catheter ought to be withdrawn as soon as the discharge of urine between the two instruments and the contact of the stone announce that the second period of the operation is accomplished. The lithotome is afterwards turned over so as to present its concavity downwards; and then after employing it as an exploring sound for the purpose of again measuring the volume and reconnoitering the situation of the calculus, the surgeon opens the instrument and gently withdraws it; gradually



lowering the handle towards the anus, until its blades are entirely disengaged. By this method we cut more exactly around the bulging of the rectum, and prevent the extremities of the cutting edges, in spite of their distance outwards, from approaching these parts too nearly.

“It is proper, after the removal of the lithotome, to pass the index finger of the left hand into the bladder, so as to measure the extent of the incisions, to be assured of the state of parts, and to serve as a guide to the forceps. The finger ought to rest in the posterior part of the wound, and thus render impossible that deviation of the forceps, sometimes observed, in which it passes not into the bladder, but into the cellular tissue between this organ and the rectum.”

The double lithotome of Dupuytren ought not to be employed by any one who is not thoroughly drilled in the use of it. He must handle it as he would a double barreled hair trigger pistol,\* and be prepared to lacerate the urethra while passing

\*“Sir A. Cooper, on one occasion proposed to perform the operation of lithotomy, in the presence of a large class, with the bistouri cache, but after getting the blade in the bladder he commenced its withdrawal with the cutting edge turned to the symphysis pubis. As soon as he discovered what was done he cautiously withdrew it from the wound, and advised the class never to use an instrument of that description.” — *Dudley in Calculous Diseases*, p. 19.



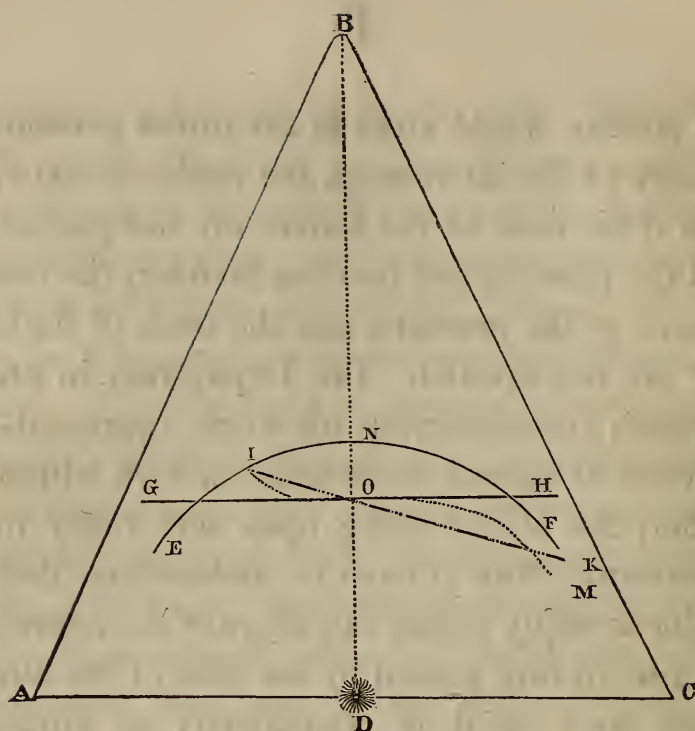
its beak along the groove of the staff. It is liable to the same objection as the bistouri caché of Frère Côme, in that it must expose the fundus of the bladder to injury ; and the more especially as the urine is always discharged through the distended and lacerated urethra before the blades are opened. I cannot think it unattended with danger to open a cutting instrument even with blunt points in a contracted bladder — an unlucky movement of the patient might push the bladder against these points ; and if not, the internal membrane of the bladder must come in contact with the edge of the instrument. The curve of the blades I think objectionable in a route of no more than the length of the prostatic portion of the urethra ; an attempt to make the incisions spheroidal is a useless refinement, and the advantage of it is more than lost by the jagged incisions which such an instrument must necessarily make when not moved with mathematical precision, and through parts absolutely motionless. The more important of these objections holds good against the modification of Dupuytren's instrument by the ingenious M. Charrière.

But neither this instrument nor that of Dupuytren, can be readily opened in a urethra surrounded by a hard prostate. Before the substance of a

hard postate would yield to the direct pressure of the edge of the instrument, the blades would bend. Then if the ends of the knives are not passed beyond the prostate and into the bladder, the remote portions of the prostate, and the neck of the bladder\* are not divided. But Dupuytren, in one of the plates accompanying his work, represents the lithotome as passed more than an inch within the bladder, the blades being open and ready to be withdrawn. Now it must be understood, that the bladder is empty during this stage of the operation; the urine having passed by the side of the lithotome as soon as it is introduced: of course it must collapse against the edges of the instrument, even if it does not spasmodically press itself against them. Under such circumstances it would seem that its mucous membrane, at least, if not the muscular and peritoneal coats, is greatly endangered.

In the next lecture I shall show you a more simple and safe method of performing the bilateral operation.

\* This term is used in various senses; I mean by it, that part of the bladder alone which corresponds to the prostate.



A triangular space formed by the anterior portion of the perinæum, lying between the symphysis pubis (B,) and anus (D,) and bounded laterally by the rami of the pubes and ischia. The point A corresponding to the right tuber ischii, and the point C to the left. The distance between these two points being about two inches and three quarters on the male pelvis. The line B D, extending from the symphysis to the anus, is also about two inches and three quarters long.

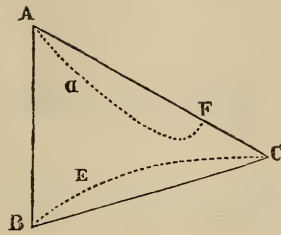
**E N F.** The semilunar incision of Dupuytren, forming the segment of a circle, the centre of which is the anus, and the radius of which is rather more than an inch, English measurement.

**G H.** The transverse incision, the length of which is equal to the cord of the preceding arc; that is, about an inch and three quarters. It croses the rapha at right angles at the point O, between ten and eleven twelfths of an inch from the anus.

**I O K.** The oblique or diagonal incision, one third of which is on the right side, and two thirds on the left of the rapha.

**I O M.** The sigmoid incision extending on either side of the rapha to the same distance as the preceding, but in consequence of its curvature, giving a cut of somewhat greater extent.

**G O M.** The incision straight on one side and curved on the other.

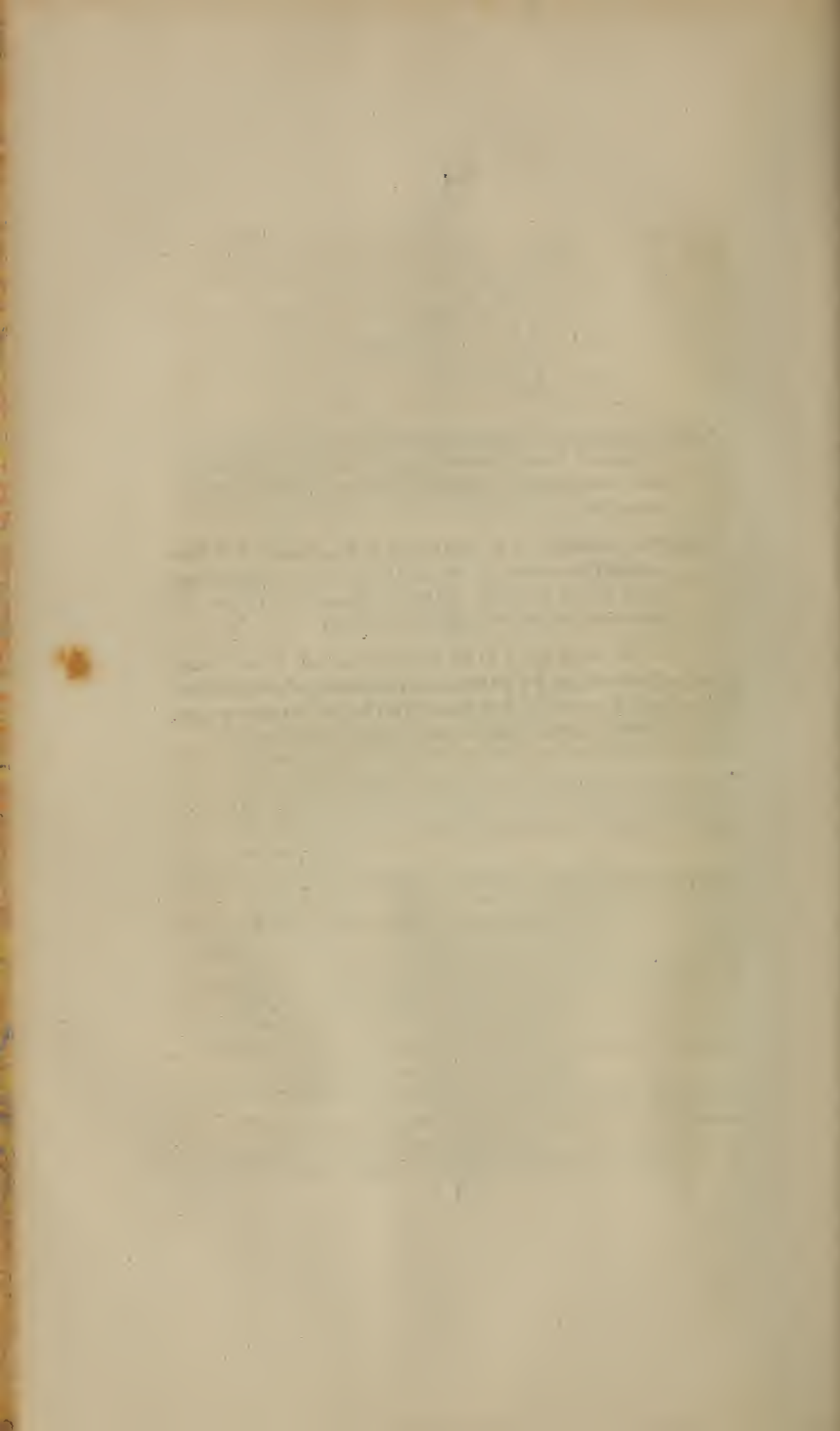


NBC. A triangle representing the space formed by the perinæum, the urethra and rectum, as seen on the median line, in a subject submitted to congelation and divided from the rapha backwards through the middle.

DB. The perinæum. AC. The course of the urethra. BC. The course of the rectum. At the point C, where the prostatic portion of the urethra terminates and the membranous part begins, the urethra and rectum are in contact, or nearly so.

The salient line A D F., represents the bulb of the urethra. The salient line B F C. represents the anterior wall of the rectum, when it is distended with fæces. This last line is subject to great variation, according as the rectum is more or less distended.





## LECTURE II.

### ON LITHOTOMY.

I VENTURE to offer to the profession a new instrument for the bilateral section of the prostate; in form it resembles a large olive, with a beak at the extremity, with cutting edges at the sides, parallel to its longest axis, and with a straight handle. The instrument of which there are three sizes, and the manner of employing it, will be readily understood by the annexed engravings. The grooved staff employed in connexion with this instrument, is as wide as the urethra will admit, and the groove gradually terminates as it approaches the end of the staff.

The advantages in the use of this instrument are, first, that the circular form of a transverse section, gives an opening through the gland of three diameters instead of two, as when a flat instrument is employed;—thus it is not necessary to carry the incision so far laterally to obtain an opening of given dimensions; and hence there is less likelihood of hemorrhage from injuring the plexus of vessels that surrounds the prostate.

Second. The prostate is cut horizontally, and though not absolutely, yet for all practical purposes in its greatest diameter.

Third. The rectum is pushed back by the convexity of the posterior part of the instrument.

Fourth. As the prostate is stretched transversely across the instrument, the section is made by a clean cut, and with so little resistance that the instrument does not, like ordinary gorgets, require to be thrust in with force, but may be passed lightly along until the section is completed. Thus there is less danger of wounding the fundus of the bladder by a sudden cessation of resistance from the parts divided; they are, in fact, divided without force.

Fifth. The easy division of the prostate obviates the danger of tearing the cellular tissue which connects the anterior surface of the bladder to the posterior wall of the ossa pubis.

*Mode of Operating.* The following is the method I have adopted, and the one I would recommend for performing the operation.

Let the patient be secured in the usual manner, but with the pelvis rather higher than the trunk, on

a firm flat table, with only two or three thicknesses of blanket under him. The rectum should have been previously emptied by a dose of oil given on the night preceding the operation, and the urine should be retained for a short time previous. The patient secured, let the assistant who is to hold the staff be placed on the patient's left, and a second assistant on his right, to support the rectum with a cloth, in case of prolapsus. The staff is then to be introduced. If you are quite certain of the existence of a stone, I would advise you not to delay the operation because you do not feel it when the patient is on the table; and much less would I advise you to ask all the assistant surgeons to satisfy themselves of the presence of the calculus. During these painful and protracted manœuvres, the urine is often discharged, and you lose the advantage of its presence in the bladder. Let only one of the assistants sound, and in doing so press the urethra against the groove of the staff to prevent the escape of urine. Exhort your patient not to strain; and while you are encouraging him with the hope of speedy relief, mark with your eye, but more especially by feeling with your finger, the exact situation of the two tuberosities of the ischia; the divergence of these two bones, the lower border of the triangular ligament, and the bulb of the urethra. The bulb is situated



directly at the lower border of the ligaments, which to pretty firm pressure will impart a greater degree of resistance than the parts between it and the anus. In a deep pelvis and with an enlarged prostate, you may expect to find a deep perinæum, and should be prepared to find the bladder more than usually out of reach. Plan for yourself an incision of a crescentic shape, posterior to the bulb, but near it—nearest it when the pouch of the rectum, as in old men is much enlarged, and in those whose pelvis is naturally narrow at the inferior strait. Let its convex side be next the bulb, its horns between the anus and the tuberosities of the ischia, not below the centre of the anus, for here are the hemorrhoidal vessel; not within a quarter of an inch of the ischia, for by approaching the bone too closely, the incision might reach the internal pudic artery. Now covering the anus with three fingers of the left hand, press the rectum backward and tighten the skin of the perinæum. As a general rule, make your incision one inch and a quarter anterior to the anus, and in length about one inch and three quarters, with slight convexity forwards. When the incision through the skin is completed, pass the fingers of the left hand into the wound, so as to tighten the fascia to be cut and to press back the rectum. If you fear you are approaching too near the bowel, put your

finger into the rectum, and ascertain the relations of the incision to that part. Continue the incisions in the same plane, but rather more forward, especially if you find your cut very near the rectum, for the gut bulges forward as it ascends. Continue to press back its anterior walls, — now pass the finger deep into the centre of the wound, and turning forward its radial edge, feel for the staff and for the bulb of the urethra. Holding your finger upon the bulb and the nail upon the staff, pass a small bistoury beyond it, and cut the membraneous part of the urethra upon the groove of the staff. This part of the urethra is surrounded by a dense fibrous sheath, the knife for dividing it should be sharp at the point or very narrow. It is not uncommon to witness delay in exposing the staff; this I believe arises from not having the urethra stretched by a large staff, from miscalculating the thickness of the fibrous sheath surrounding it, or lastly, from using a broad pointed knife. The membraneous portion being divided, pass the beak of the bisector into the groove, and holding the staff with the left hand, glide the bisector with the right hand along the groove until the escape of urine advises you that the section is completed. The angle which the bisector should make with the staff, should be just enough to keep the beak in the groove. If the patient is young, you may

be well assured that you can reach the bladder with the finger. So you will in adults and old persons, unless the pelvis is deep or the prostate enlarged. In the latter cases only you may leave the staff in the bladder to guide the forceps; but in my own practice, I have always withdrawn the staff as soon as the section of the prostate was completed, introducing my finger into the wound at the same moment.

The Prostatic Bisector was employed in the two following cases.

CASE VII. — John Roselle, eleven years old, small of his age, and labouring under symptoms of stone in the bladder for nearly five years, was admitted into the New-York Hospital, in the early part of November, 1836. After an examination with the sound and finger in the rectum, Dr. Stevens expressed his opinion that the stone was of unusual size for a child, and he decided upon performing the bilateral section of the perinæum and neck of the bladder by which the greatest possible space could be procured for the safe removal of the stone. Accordingly on the 10th of November, the necessary preliminaries having been adjusted, and being prepared with an instrument he had devised for the operation, and which he terms



the prostatic bisector, he made a semilunar incision through the integuments about midway between the anus and the lower border of the symphysis pubis, the ends of the incision pointing backwards. The cellular tissue and the condensed fibrous structure forming the union between the anterior fibres of the sphincter ani and the posterior fibres of the *acceleratores urinæ*, &c., were next cut in a direction parallel with the first incision, and the wound thus carried completely down to the membranous portion of the urethra which was then divided. The scalpel was now laid aside, and the bisector with its beak properly adjusted in the groove of the staff was then pushed on into the bladder; cutting through the prostate gland still in a direction nearly parallel with the primary incision, and dividing it on either side of the urethra through its greatest diameter.

Although the incision thus made into the bladder was large, in consequence of the great size of the stone it was withdrawn with difficulty; and in fact, before disengaging it from the wound, the operator was obliged to divide the transverse perinæal muscle of the right side, this muscle and its fellow being stretched over the upper part of the stone. The stone was in form a flattened ovoid composed of phosphate of lime; its weight was three ounces;



its measurement six and a quarter inches in its longitudinal, and four and a half in its shortest circumference. It was finally extracted by a curved lever and the finger of the operator.

No untoward symptoms followed the operation except that from some improper indulgence in food, the child had an attack of erysipelatous inflammation around the wound. This, however, was soon overcome by anodyne lotions, and a stricter attention to regimen; and before the close of the month he was sufficiently well to leave the hospital. A slight oozing of urine continued for a few weeks longer; but the wound was examined in January and found to be entirely healed.

CASE VIII. — Noah Avery, a mulatto child, aged six years, was admitted into the New-York Hospital, November 14th, 1837. He had an expression of suffering in his countenance; he was often fingering and pulling at the prepuce; the integument, and indeed the whole body of the penis, were unusually developed. The act of micturition was repeated almost hourly, and attended with much pain and straining, and generally with simultaneous discharges from his bowels. When the bladder has partially emptied itself, and the spasm is coming on, he arrests the flow of urine by pres-

sing upon the end of the penis, and after a few moment's delay, suffers it to flow. He passes his water with most ease when his hips are elevated; and his mother is in the habit of raising him by the heels and shaking him; and after this he is easy so long as he is kept with his heels elevated. Sometimes he requires his mother to press upon his abdomen; this and the shaking by the heels, are often repeated ten or twelve times during the course of the night; and in the intervals he rests upon his knees with the buttocks elevated and the face upon the pillow. He is not disposed to run about, but walks with a cautious step. Occasionally, he is seized while walking, so suddenly and severely with pain at the end of the penis, that he falls as if struck down. The urine is turbid and leaves a tenaceous matter adhering to the vessel. He has had these symptoms in a greater or less degree since the age of thirteen months. The existence of a stone was first ascertained by sounding, about a year since. In damp weather, and after exposure to cold, all these symptoms are aggravated. He has long been accustomed to take large doses of laudanum.

He had been exposed to the contagion of measles prior to his admission, and soon afterwards went through an attack of this disease without any bad symptoms.

On the 25th of November, the fever having left him, and the urine being charged with free acid, he was put on the use of carbonate of soda grs. x. three times a day, taking every night his accustomed draught containing tinct. opii. gtt. xxv.

On the morning of the 2d December, he had an injection which procured two free discharges, after which he took tinct. opii. gtt. lx., and at noon was brought into the theatre to undergo the operation. After securing him, the sound was introduced; it immediately encountered the stone. The cries and straining of the child caused a discharge of urine and prolapsus of the anus. The escape of urine, which pressure upon the prepuce around the staff failed to arrest, was stopped by pressing the urethra against the instrument. The bowel was then pushed up and kept up with a cloth by the operator while making his incisions. After the first incision, a large and consistent mass of fæces was discharged, and during this discharge the operation was suspended. The steps of the operation were the same as in the case of John Roselle already related, except that the membraneous portion of the urethra was first penetrated beyond the bulb, with a small curved flat-pointed bistoury, with its edge toward the groove of the staff, and divided in the withdrawal of the instrument with its



edge downwards. The prostatic bisector employed in this case was of the smallest size — a thread passing round its bulging part and including the staff at the same time that the beak of the one rested in the groove of the other, measured one inch and a half. The staff employed was as large as the urethra could admit, and deeply grooved. Less than half an ounce of blood was lost in the operation. The stone was readily extracted with the finger and scoop or curved lever. It was as large as a pigeon's egg, rough, and of a yellowish gray colour.

After the operation, the patient was taken to a warm bed, placed upon his back with his knees elevated, and a gumelastic catheter introduced into the bladder through the wound, care being taken to pass it to the precise distance necessary, and no further than the termination of the incision in the bladder. At four o'clock P. M., he had had several paroxysms of spasm, and bearing-down efforts like those before the operation, during and subsequent to a discharge of fæcal matter from his bowels; pulse 135, — skin hot — urine flowing through the catheter and at intervals by the natural passage. At 9 P. M., — pulse 140 — skin hot and moist, occasional spasms, no tumefaction or tenderness of abdomen, very slight tenderness on

pressure in a direction behind the pubes. V. S.  $\frac{3}{4}$  vi. catheter removed; fomentations to the abdomen, his usual anodyne.

Second day, at 8 A. M. — Pulse 140, tongue white, skin hot and moist, drops of sweat on the upper lip, over the face generally and on the upper part of the trunk; urine passing every two or three hours through the penis and through the wound; countenance and spirits good; pain rather increased; he asks his mother to press upon the abdomen. Fomentations continued over the abdomen. — Castor oil,  $\frac{3}{4}$  ss., diet of arrow root, drink of cream-of-tartar-water and lemonade. At 9 P. M., the oil had operated freely; abdomen soft but somewhat tender; eleven leeches were applied to the inguinal regions, and the fomentations continued.

Third day, at 9 A. M. — Rested well last night; urine flowing both ways; pulse 130; no pain; skin natural; tongue moist at the edges, slightly brown in the centre; he had an operation from his bowels before daylight. At 4 P. M., pulse 120; has asked for oysters; sits up in bed and amuses himself with toys; sleeps indifferently on his back or on either side, and with his thighs either extended or drawn up.

Fourth day, at 9 A. M.—Increase of the paroxysmal pains, tenderness in the inguinal regions. Fomentations continued, castor oil,  $\frac{3}{4}$  ss. diet, gruel. At 4 P. M.—the oil had operated, all the symptoms aggravated, pulse 140. Under a supposition that the symptoms might be owing to the presence of a small portion of the calculus broken off and left behind, a female sound was introduced into the bladder, but nothing was discovered.

Fifth day, pulse 120, at 9 A. M.,—skin moist, —upper lip covered with drops of sweat,—urine free both ways,—slept well in the intervals of his paroxysms which recurred every few hours,—was ravenous for hearty food during the night,—allowed roasted apples,—during the day, he amused himself with his toys.

Sixth day, at 9 A. M.,—pulse 120,—no heat of skin,—urinates mostly through the penis. He took an ounce of castor oil in the afternoon, which brought away two large lumbrici, one of them nearly a foot long.

Seventh day,—slept without his opiate last night—much improved,—permitted to take animal food.



Ninth day, at 9 A. M.,—sits up nearly all the time, but still has occasional pains in the abdomen,—took two ounces of the compound infusion of senna, which operated repeatedly, and with great pain, but brought away another worm.

Tenth day,—some purging and tenesmus,—ordered chalk mixture,  $\frac{3}{4}$  ss., with tinct. opii. gtt. xx.

Eleventh day,—urine passes through the penis without pain; the wound which has always looked well, is now contracted to the size of a pea.

On the 17th of Dec., the wound had healed, and on the 22d. of this month, he was discharged, cured.

In looking back upon the details of this case, it is important to note how the constitutional irritation and severe paroxysms of pain, like those caused by the calculus, were excited—first by the worms, and afterwards, by the oil and senna. Had the boy been cautiously indulged in the use of food, it would, I think, have been better than to have bled and purged him.

## ON PREPARATION AND CHOICE OF SEASON FOR THE OPERATION.

In this country I believe no one season is more favourable for operating than another. It was formerly the practice of surgeons to prepare their patients by bleeding, and a course of dieting. Of late years, all preparation is very much neglected; perhaps too much so. If the secretions are suppressed, they should be restored. The condition of the urinary organs may very often be materially improved by the use of alkaline or acid remedies, according to the indication furnished by the state of the urine. The best condition of the system is that of good, but not too high health.

### OF SOUNDING.

The best instrument for sounding is a straight staff, or one with a very slight curve; this may be moved about the bladder with less pain than one of the common kind. If the stone is not readily found when the bladder is full, it should be emptied, and the position of the patient should be varied.

For estimating the size of the stone, and the condition of the prostate, let the patient be placed in a half-recumbent posture; place yourself on his left, and with the right hand press above the pubes,

while the index finger of the left hand is passed high up the rectum, your middle finger must be buried in the cleft of the nates, and the thumb resting in the pudendum. The prostate, and probably also the stone, will thus be brought within your reach. Next let an assistant press against the pubes; and taking the staff in the right hand, move it gently around the bladder, and in this way get an idea of the size and sensibility of its inner surface. Then press the hand backward. The distance of its posterior surface from your finger, is the measure of the thickness of the prostate gland. When you strike the stone, judge of its magnitude by the kind of shock it gives the staff. If the stone is found with difficulty, and readily lost, you may infer that it is small; but if it is readily encountered, and if the instrument may be moved without ceasing to touch it, you may presume that the stone is large. If the sound strikes the stone the moment it enters the bladder, and cannot afterwards be pushed on or moved about, the stone probably fills the bladder. In this case it also ought to be very plainly felt by the finger in the rectum. The hardness and smoothness of calculi may also be ascertained by the sound. If, after repeated examinations, the stone is always found in the same part of the bladder, it may be supposed to be sacculated or adherent.



There is much resemblance between the feel of a soft or fusible calculus and a hard carcinomatous bladder. But in this latter case, the sensation of a hard body will always be felt in the same part of the bladder ; in the former it will most probably vary. I have known the point of the sound to get hitched under a projecting band of muscular fibre of the bladder, and when suddenly forced from this position, to communicate to the surgeon a very deceptive shock.

#### OF SOUNDING THE PATIENT ON THE TABLE.

The following case is published in the Archives Generales, August 1826 :

**CASE IX.** A child, aged two years and a half, had suffered from uneasiness in the penis, and pain on making water. On sounding, M. Roux thought he felt a stone ; but on the operating table, on sounding again, the results were less satisfactory. M. Velpeau, and others, introduced the instrument, and could not satisfy themselves of the presence of a calculus. M. Roux, however, thought he felt one ; and the recollection of a former case where he alone had discovered a small calculus in the bladder, determined him to operate. The operation was performed with Hawkins' gorget, but no stone could be found. Peritonitis succeeded, and

in sixty hours the child was dead. No examination of the body was permitted.

This case will probably be considered as showing the propriety of always sounding the patient upon the table just before the operation.

Mr. Liston holds this language :

“The operator will, for his own sake, satisfy those who are present as well as his advisers and assistants of the fact that there is a stone in the bladder.\* This is the advice usually given ; but I cannot give it to you, nor do I follow it. Rather satisfy yourself, some days before the operation, of the existence of the stone. If you cannot satisfy yourself beyond all doubt, seek other counsel ; but when you place your patient on the table, let it be for the purpose of his undergoing the operation and for that solely. This surely is enough for one day’s endurance, without the torture of such examinations as are implied in the passage above quoted, and which are practised from a sort of courtesy to those who may be present. How often does it happen that the urine escapes during the repeated sounding ; how often do the efforts it ex-

\* Listons’ Elements.

cites cause prolapsus ani! Who is to answer for the skill and tenderness of those around you! I have seen the sounding done very roughly when the staff was yielded to a person who should have been only a spectator. It is true that instances have occurred in which the operation has been performed and no stone existed. But this does not conflict with my position. Make your diagnoses deliberately and cautiously; but do not bring your patient to the table until it is made, and when you do, let it be for the operation, and that alone.

CASE X. The following case is reported in the London Medical Gazette :

“Two or three times he was carried to the theatre, [of the Hospital] for the purpose of having the operation performed; but when sounded on the table, the stone could not be felt. The operation of sounding always excited very excruciating pain; the bladder was felt to be roughened and hard. After a variety of opinions upon the subject, all the surgeons at length agreed that there was a stone, and that it was soft.” The stone broke into pieces. “*There was great difficulty in extracting them, on account of the extreme softness of the external layer of earthy deposit which broke*



under the slightest touch of the forceps. The scoop was used to extract the fragments. A large dose of opium was given to him immediately after he was removed to bed. About an hour after this, he was visited, and found to be recovering from faintness; he complained of a little pain. Camphor julep was directed to be given to him frequently. In the evening he was tolerably easy, so as not to require an anodyne.

The patient died, and Dr. Hodgkin gave this account of the dissection:

“The bladder was of a moderate size and flaccid, and the muscular coat very little, if at all thickened. The *mucous membrane was of a dark olive colour*, with very general thickening, and *abrasion* on the summits of all the turgid and elevated points.”

This in fine, is a case of death from inflamed bladder and exhaustion; may not this condition of the bladder have been owing in part to the repeated soundings? Would it not be better in cases where the stone breaks and the patient is getting exhausted, to leave the fragments, and trust to their coming away by keeping the wound open, or removing them after the inflammation had subsided?

## EXTRACTION OF THE STONE.

In an operation I performed on Mr. Purdy, the father of the Drs. Purdy of this city, two smooth calculi as large as a shilling were discharged with the gush of urine that followed the stroke of the bistoury. But it is rare that the introduction of an instrument is not required for the removal of stones after the incision is made. The forceps for this purpose may be introduced either upon a blunt gorget, used as a conductor, according to the recommendation of Bromfield and Martineau; or upon the index finger of the operator when the stone can be reached in this way. A forceps about twelve inches long will be found of the most convenient size for an adult. The hinge should be at two thirds of the length from the extremity of the handles. The instrument with open blades, introduced by Dr. J. Rhea Barton, appears to me to be an improvement. The hinge of Mr. Weiss, too complicated for description, but exceedingly simple in operation, allows the blades to be nearly parallel when the stone is grasped. Mr. Martineau makes use of the straight forceps, preferring an instrument rather large to the small and flat one.

In introducing the forceps, the blades should be on a level with each other, and the instrument

moved about closed until the stone is felt, if it has not been previously felt with the finger. The stone will usually be found resting on the posterior part of the bladder; open the instrument with the blades one above the other, pass it onward, and probably the stone will be properly seized. If it is not grasped, and is lying behind the ossa pubis, open the blades horizontally, and probably the stone will fall down between them. The stone is sometimes lodged behind the lower lip of the prostate. It may be seized there with a crooked forceps, or what is better, raised to the level of the incision by inserting the finger into the rectum. If the stone is not properly seized, the grasp of the forceps should be relaxed, until it can be secured with its flat sides against the blades, and its longest axis in a line with them. In withdrawing the forceps, its blades should be perpendicular to one another. In my own practice, if the stone is large, I prefer the lever; in withdrawing the stone, the line of traction should be in the direction of the axis of the lower strait of the pelvis. How much force may be safely employed in the extraction of a stone? Force applied to the stone *before* it is out of the bladder, must be more dangerous than that which is applied after the stone has been brought partly out. In the former, the bladder and prostate are contused and lacerated, in



the latter, the injury is done to less important parts, muscles and cellular tissue. It is certain, that very successful operators are in the practice of using at times, a great deal of force, enough to draw the patient from the table, if not held there; and reasoning, no less than experience, justifies this practice within certain limits. The alternative is in a great degree between a wound contused even to disorganization, and an extensive deep slough from urinary infiltration,—the former is the minor evil. A careful surgeon will not be taken by surprise, but be prepared with a suitable instrument for crushing a stone too large to be extracted with safety. If the opening of the blades of the forceps indicate a stone of more than two inches in its smallest diameter, he will not be able to remove it by a force equal to the lifting of forty pounds, which I conceive is the utmost that is justifiable.

#### OBSTACLES TO THE EXTRACTION OF THE STONE.

Sir Astley Cooper speaks of *spasm* of the bladder during the operation, as one obstacle to the extraction of the stone. Sir Charles Bell writes thus:—“In the contraction of the bladder, after the incision for the stone is made, there is a circumstance particularly deserving of notice, and

which could not be hitherto understood, from inattention to the structure and action of the muscles of the ureters. Some have described the cause to which I allude, as a sacculated stone; others have called it the hour-glass contraction of the bladder. The fact is this, by the pressure of a stone, and the frequent desire to make water, the muscular fibres of the bladder acquire a very considerable strength and prominence. But of the fleshy columns, the muscular fibres of the ureters become remarkably enlarged. Accordingly it happens, that where the incision is made and the urine escapes, these muscles contract, and then the surgeon feels a sort of orifice within the bladder beyond the edges of the incision; and through this second orifice he can touch the stone with the extremity of the fore finger. He finds great difficulty in seizing the stone when it is in this confined situation.”\*

In the operation of lithotomy, I have felt these muscles passing down to the ureters, and drawing the centre of the bladder nearly into a circle, so as to enclose the stone. This, I am inclined to believe, has sometimes been called a sacculated calculus; whereas, it is the natural consequence of

\* Surgical Illustrations, p. 114.

the excitement of the bladder during a protracted operation. I have twice met with occurrences precisely such as Sir C. Bell here describes. The spasm, or temporary sacculated condition, lasted but a few moments, and returned several times. I prefer the use of the fore-finger of the left hand and a *lever* in such cases to the forceps.

Sir Charles Bell considers the fibres of the levator ani as offering some resistance, but when we reflect that it must be shortened by the elevation of the anus, it would seem impossible for this muscle to offer much resistance; perhaps the aponeuroses which envelope it may present an obstacle of more or less force.

Among the causes, then, opposing the withdrawal of the stone, the muscular fibres at the neck of the bladder, especially when in a state of spasm, are first to be considered. This cause may be overcome, without laceration, by steady gentle traction.

The second cause of resistance is the fibrous capsule of the prostate gland. This capsule will yield to a limited extent only; beyond which, if force be applied, it will be torn. M. Senn considers this the sole obstacle, and from what I have



seen, both in the living and on the dead subject, I am persuaded it offers a strong barrier.

The third is the substance of the prostate gland itself. This is more disposed to be lacerated than to be stretched. M. Senn\* thinks that the opening is enlarged by its compressibility, an effect which the solidity of this substance must often prevent.

\* "It is wrong to search in the resistance of the soft parts forming the perinæum, and in that of the lower strait, for the causes of the difficulties experienced in extracting calculi of a certain volume. It is at the neck of the bladder itself, surrounded and fastened by the prostate, that we really find these; and to be convinced of what I state, it is only necessary to operate upon the dead subject; it will be at once seen that the difficulties are not at all changed whether the prostate be covered by the soft parts or not, and that upon a well formed pelvis, the interspace between the rami of the arch is more than sufficient for allowing the free exit of calculi, the extraction of which can be effected by the sub-pubic operation. Besides, it will be found, let the urethra be divided as it may, that what we obtain in attempting to dilate the wound with the finger, or with instruments, is owing to the compressibility of the glandular parenchyma which permits itself to be pressed together on all sides, or to its rupture; but not to its extensibility, rendered void by the fibro-cellular tunic which envelopes it, and which resists even strongly the most considerable pulling. But if, on the one hand, the prostate thus supported is opposed to the extraction of foreign bodies, surpassing a certain volume, it protects, on the other hand, the body of the bladder, and prevents imprudent operators, when attempting to withdraw calculi of too great a volume, from producing serious injuries, capable of endangering the life of the patients. It is a useful barrier which should not be entirely freed by cutting the gland through its whole thickness; for, by this process, we would be liable not only to wound parts which cannot be injured without inconvenience, but moreover to produce rupture of the body of the bladder at the moment of extraction."

Recherches sur les différentes méthodes de taille sous pubienne par F. L. Senn de Genève. — p. 8 & 9.

The fourth obstacle is presented by the transversalis muscle, if its fibres have not been completely divided.

Do the bones of the pelvis ever offer any resistance? In the bilateral operation, probably not; but in the lateralized operation, if the incision is not carried as near the rectum, and continued as low down as it may be with safety, some resistance must be caused by them. This resistance would be greater were not the prostate and neck of the bladder displaced and borne backwards and to one side by the yielding of the ligaments of the bladder. When great force is applied, these ligaments, as well as the cellular tissue behind the pubes, are lacerated. The resistance of the bones may, in some measure, be eluded by depressing the blades of the forceps and drawing in the direction of the lower strait of the pelvis.

In a few words: I consider the resistance to arise from the capsule of the prostate, and the neck of the bladder; from the transversalis muscles when not divided on either side; from the levator ani and its investing fasciæ.

The following experiment was made upon a male subject, about 35 years of age, four days after his death, the weather being cold:

A grooved staff was introduced into the bladder and a transverse incision, one inch and a half long, and one inch anterior to the anus, was made upon the staff into the membranous part of the urethra, and the prostatic bisector was introduced along the groove into the bladder. The bisector and staff, placed in position, measured three inches and a half in circumference. The fundus of the bladder being then opened, it was ascertained that the incision had approached within one or two lines of the sides of the prostate which, however, were not entirely divided.

A large forceps was then introduced, and an egg-shaped stone properly placed within its grasp. The stone and forceps, measured together, gave a circumference of nearly six inches. The instrument, with its blades perpendicular, was then pulled upon with a force that might have been sufficient to lift a weight of twenty pounds, and moved from side to side and up and down. The largest circumference of the stone did not pass out of the bladder until the traction was increased to forty pounds. A very moderate degree of force then sufficed for its removal; but there was a sense of tearing, as the stone passed through the external incisions. It seemed that the fibrous capsule of the prostate had offered the first and greatest resistance; the levator ani the last.



The tract of the wound was next exposed to view, by extending the left side of the incision through the bones and soft parts, so as fairly to lift them over to the right side of the pubes.

In the posterior plane was the lower half of the prostate apparently not much contused or lacerated, (the lower blade of the forceps had covered this ;) between it and the anus were the longitudinal fibres of the rectum about a line in thickness. On the right side of the prostate were some stretched and lacerated fibrous shreds, like fine cotton thread, connecting the upper and lower halves of the prostate at their edges. Between this part and the right extremity of the external incision, were indistinct portions of muscular fibres, parts of the levator ani and of the transversalis. On the left side of the prostate, where the incision had been extended after the removal of the stone, a large plexus of vessels, filled with venous blood, was brought into view. The parts were then carefully smoothed with the handle of the scalpel, and with this and the finger the loose cellular tissue was separated until three pouches or cavities, more or less connected with the tract of the wound, were brought into view ; — the first, high up on the right side, was bounded externally by the obturator internus muscle, internally by the bladder

and prostate, and inferiorly by the levator ani; below the levator ani was another pouch which extended in front of the sacrum and behind the rectum; between the rectum and the bladder was a third cellular space in which the cellular structure was rather less loose than in the other two.

### OF LEAVING THE STONE BEHIND.

The records of surgery furnish a few cases in which, from the exhausted state of the patient, or the magnitude of the stone, it had not been extracted at the time of the operation, but remained a day or a week afterwards, or has been expelled by the efforts of the patient. But to send a patient from the table with the stone not removed, is to leave him to his fate, which must be pretty uniformly fatal; and this result, I apprehend, is equally to be expected when the slipping of the gorget leaves the bladder unopened. The rule for getting your instruments into the bladder is hardly more imperative than that of getting the stone out.\*

\* If any exception is made to this rule, it is in the case of a small stone. If this cannot be found after a reasonable search, rather than exhaust the patient, it would be better to put the patient to bed, and trust to its expulsion, or to search for it after one week has elapsed.

In the London Medical Gazette, Mr. Travers states that he had operated twice without finding the stone; yet it was the opinion of four or five surgeons

In the cases of very large stones, the resources are, 1st., the high operation ; 2d. the crushing of the stone. The former of these has been so generally fatal that I would rely upon the latter.

#### OF INFILTRATION OF URINE.

The symptoms of infiltration of urine after the operation of lithotomy, are like those which occur after the bursting of the urethra behind a stricture ; or after the urethra has been lacerated by an instrument or by a fall upon the perinæum. During the first few hours there is often nothing remarkable, except that the patient will acknowledge a sense of distension and soreness. You first notice a little heat of skin, increased frequency of pulse and indisposition to sleep, but not always pain. Before the close of forty-eight hours, the pulse will rise to 100 or 140 in a minute ; the countenance become anxious, the face flushed, and skin dry. Soon after this, the pulse will intermit two or three times in a minute. Then follows hiccup, with abdominal tenderness and distension, and death soon afterwards ensues. The condition of the

that the stones were in the bladder. Both these patients recovered. I have known the operation performed in one case where there was no stone : in another case, the gorget not entering the bladder, the stone was left. Both the cases proved fatal.



patient previous to the operation, the manner in which this has been performed and borne, and the period of time afterwards at which these symptoms occur, will enable you to distinguish urinary infiltration from the exhaustion or sinking caused by the shock of the operation upon the nervous system.

Now the symptoms of urinary infiltration are the symptoms of mortification, their cause is mortification, and their treatment should be the same as for this. The means of preventing their occurrence is by affording a ready exit for the urine through the external wound. After the patient has been placed in bed, pass a wax bougie or a hollow gum elastic catheter into the wound, and allow it to remain until the flow of urine is perceived by the side of the instrument, or through it. I prefer a small catheter, as this conducts the urine away beyond the buttocks of the patient. It should not be passed in further than is absolutely required to draw off the urine. If any straining to make water is observed, as may happen when the instrument has partially slipped out, we should have it immediately pushed up and properly secured.

The gravitation of urine will not cause infiltration. Where the case goes on well for thirty-six hours there is little to be apprehended from infil-

tration of urine. The effusion of fibrin, by which infiltration is prevented, takes place more rapidly in childhood than in adult and old age. In constitutions disposed to diffuse inflammation, the effusion of lymph may be delayed indefinitely.

When infiltration has occurred, the patient should have such food as he may desire, and he should be supported with wine, ammonia and opium. Purging and any antiphlogistic treatment will only hasten the fatal termination. In men, the result is generally fatal; in children, it is not always so. In the latter, healthy suppuration may come on, the sloughs separate, and the patient get well.

I knew of no one except Sir B. Brodie who has ventured upon any local treatment that can be considered effective. He passed a blunt bistoury to the bottom of the wound, and upon the finger, introduced within the rectum divided all the parts between the two. This proceeding, worthy of all praise, rescued his patient from impending death. As external applications, warm and spirituous fomentations are best suited to such cases until suppuration is fairly established.

After suppuration, (which indicates a state of the system free from the oppressive influence of a

mortifying tissue,) has been fully established, emollient applications should be substituted and the diet and internal remedies should be of a less stimulating character, yet sufficiently tonic to support the strength of the patient.

### OF HEMORRHAGE.

It is difficult to state with precision what amount of blood may be lost in the operation or after it, in order to constitute an alarming hemorrhage — enough to make the patient swoon upon the table or to make him feel faintish at any time after he is in bed, is undoubtedly of that character. I should feel uneasy for a patient who lost a pound of blood during the operation. It is very desirable to avoid the use of a ligature or compression. But where the force of the arterial jet is great, every prudent surgeon will endeavour to apply a ligature at once. It is much easier to seize the open mouth of a recently cut vessel, or to tie its trunk immediately before the vessel has retracted and the parts are sore and swollen. If the open mouth of a vessel cannot be brought into view, and you find that pressure upon the trunk of the internal pudic arrests the bleeding, this should be secured by a ligature. The operation has been often done and no considerable difficulty ought, I should judge, to attend



the performance of it. A probe being passed between the artery and the bone and its point made to penetrate into the wound, a ligature may easily be passed over it, so as to embrace all the parts between the wound and the instrument.

If the blood comes from the upper part of the wound, and pressure on the internal pudic does not arrest it, the first resource should be cold drinks, and the application of cold cloths. Perhaps the internal use of sulphuric acid, the acetate of lead or the sulphate of alumine might in such case be useful.

In either case, if these means fail it only remains to employ compression in the following manner ; — tie a soft linen cloth around a female catheter, about one inch from its beak. Pass this into the wound until the beak corresponds with the commencement of the urethra. Then fill with lint the space between the instrument and the cloth, and secure the whole with a T bandage.

Dupuytren invented an instrument which will probably be found to answer still better. Its shape is like a dissecting forceps with round extremities to the outer sides of whose blades are attached some firm padding. The elasticity of the

instrument tends to keep its blades open and thus press laterally in opposite directions its padded extremities.

All these hæmostatic measures are uncertain, painful and very liable to induce dangerous inflammation.

#### OF INFLAMMATION OF THE BLADDER.

Inflammation of the bladder is attended with incessant pain at the end of the penis, soreness and swelling in the groins, nausea, yellow furred tongue, and other symptoms of febrile irritation. It is very much beyond the reach of general depletion. Leeches, fomentations and the hip bath, are the best palliatives. Internal remedies tending to irritate the urinary organs, or to act violently upon the intestinal canal are hurtful. Indeed I have known severe pains at the end of the penis, and a great deal of febrile irritation to be produced after the operation of lithotomy by calomel, followed by infusion of senna. Part of this distress, no doubt, was spasmodic — but continued spasm of the neck of the bladder may readily induce inflammation. An opiate injection is the proper remedy.

## OF THE OPERATION IN CHILDREN.

An accurate description of the anatomy of the parts concerned in lithotomy during the period of childhood and adolescence, is a desideratum in surgical anatomy. My own researches are so limited as to render them hardly worthy of being offered to the public. It may be stated, however, that the prostate is scarcely at all developed before the age of puberty. In three subjects examined with special reference to this point, it was found that in a child of two years old, when the bladder was distended with air, the prostate measured laterally  $\frac{1.1}{2.0}$  of an inch, and vertically  $\frac{.9}{2.0}$  of an inch in diameter — its parietes being very little if at all more dense than the walls of the bladder itself. In a child three years and a half old, its lateral diameter was  $\frac{1.3}{2.0}$  and its vertical diameter  $\frac{1.0}{2.0}$  of an inch. In a boy eleven years old, its transverse or lateral measurement was  $\frac{1.5}{2.0}$  and its vertical measurement  $\frac{1.3}{2.0}$  of an inch, its parietes being still scarcely any thicker than those of the bladder.

The results of the operation in childhood are more favourable than in mature or advanced age. This is owing probably to the less depth of the perinæum, and perhaps also to the fact that the



prostate not being developed, the sympathies of the genital organs are not excited by the operation.

### OF LITHOTOMY IN THE FEMALE.

I have on six occasions, removed stones or other foreign bodies, from the female bladder.

In a female, on Long-Island, under the care of Dr. Purdy, of Great Neck, I found a calculus nearly as large as a hen's egg, engaged in the urethra, and apparently prevented from coming away only by the muscular fibres of the sphincter. I cut upon it through the vagina, and hooked it out with my finger, leaving the sphincter untouched. This occurred about fifteen years since. The woman is still living, and I learned from her a few months ago, that the power of retaining her water is perfect, and that it has been so since a month after the operation.

A black woman was brought to the hospital, in the year 1826, with stone in the bladder. I extracted without cutting, a foreign substance which proved to be a piece of greased brick about as large as the thumb. Dr. Ferriar brought to me about two quarts of the same materials, which he had removed; each piece being very similar in

shape and size to the one I removed. I have understood that as many more have since been taken from the bladder of the same patient. She had caries of the spine, brought on, as I suppose, by her vile habits.

An hysterical young woman having retention of urine, a gum-elastic catheter was used to draw off the water. Soon afterwards it was discovered, that the instrument, about eleven inches long, was in her bladder. After six weeks, being consulted by Dr. Rapalje of Brooklyn, I removed it, by dividing the meatus. Two years afterwards, the same occurrence took place again in the same female. On this occasion I dilated the urethra with my finger, so as to pass in a polypus forceps, and readily brought away the instrument. At this period she had, with her other symptoms, a constant muco-purulent discharge from the bladder; and the catheter, which had remained there ten days, was incrustated as in the former case with a thick calcareous deposit.

Although the first of these operations was not followed by inability to retain the water, yet I prefer the latter method, and conclude that almost all calculi may be removed from the female bladder, either whole or broken, by dilatation alone.

## EXPLANATION OF THE PLATES.

PLATE I.—Fig. 1. The Prostatic Bisector.

Fig. 2. The same seen laterally.

Fig. 3. A transverse section of the same at its largest part.

PLATE II.—Intended to illustrate the description of the parts of perinæum, as given at page 26, within which the lithotomist should confine his incisions. A, the anus. B, the lower edge of the symphysis pubis. C, the termination of the os coccygis. DD, the tuberosities of the ischia. E, the form and extent of the primary incision in the bilateral operation.

PLATE III.—A representation of the deep portion of the perinæum. The superficial parts including integuments, muscles, fasciæ, and the urethra as far as the commencement of its membranous portion, have been removed, so as to show the relative position of the prostatic portion of the urethra to the walls of the prostate, and of that body to the rectum, &c.

AB, The bones forming the lower strait of the pelvis.

C, The rectum, capable of being distended so as to spread out upon the posterior edge of the prostate, and partially embrace it, as represented by the dotted lines DD.

E, The prostate gland of natural size in the adult subject.

F, The part of it through which the urethra passes.

GG, The greatest lateral measurements from the urethra to the external borders of the gland. The prostate being stretched by the staff, these lines represent the direction of the incisions made by the bisector.

HH, The prostatic ligaments passing backwards from the posterior part of the pubes.



PLATE IV. — This figure, referred to at page 41, illustrates the Celsian mode of operating for the stone. The index and middle finger of the operator are introduced into the anus, so as to reach beyond the calculus, and press it outwards through the lunated incision, which is continued onward from the integuments in front of the anus, until it reaches the stone at the neck of the bladder.

PLATE V. — This figure represents the mode of introducing the prostatic bisector, directed by the grooved staff from the bottom of the external wound through the prostate gland, into the bladder.

FINIS.

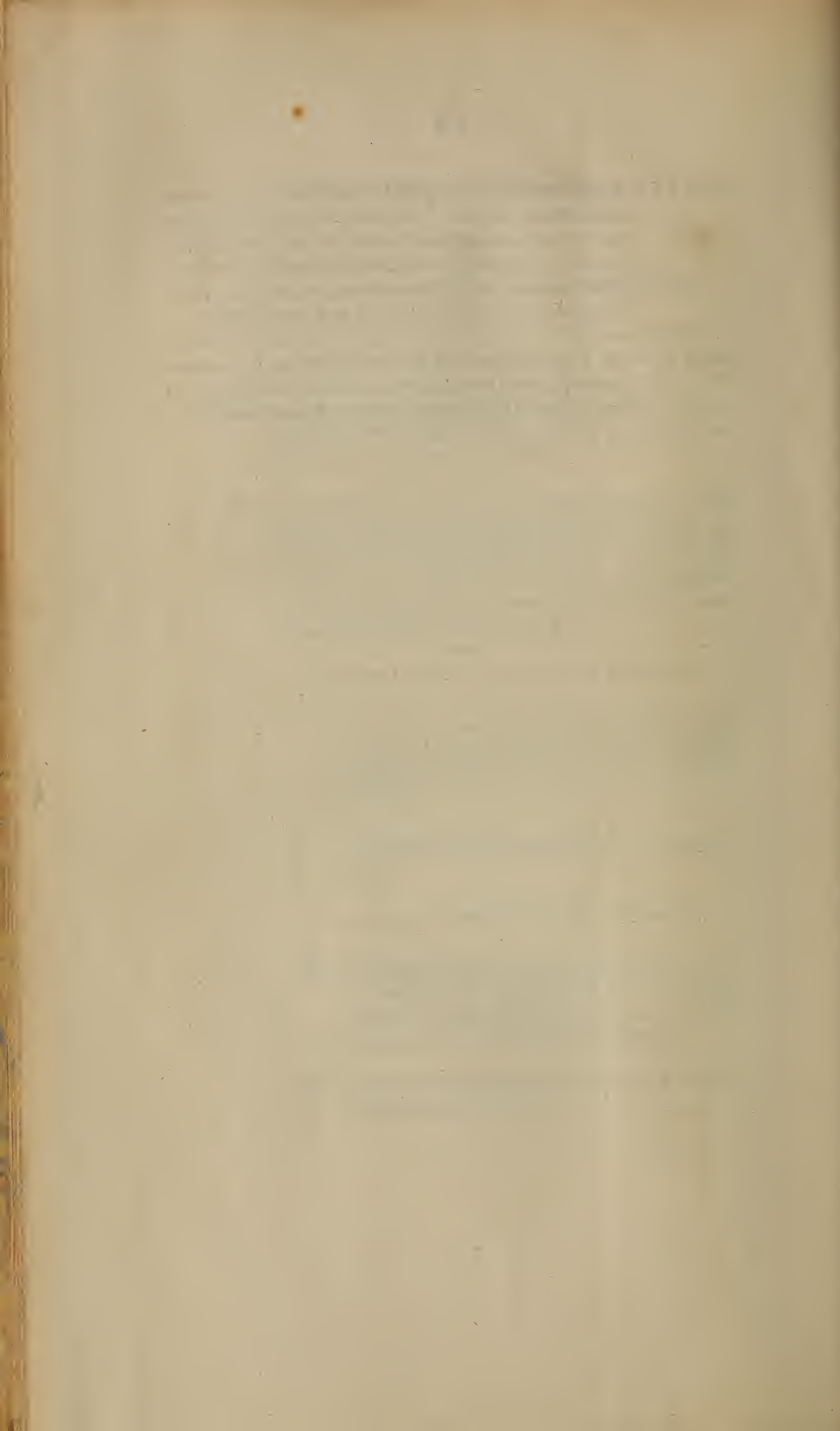
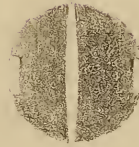


PLATE 1.

PROSTATIC  
RESECTOR.



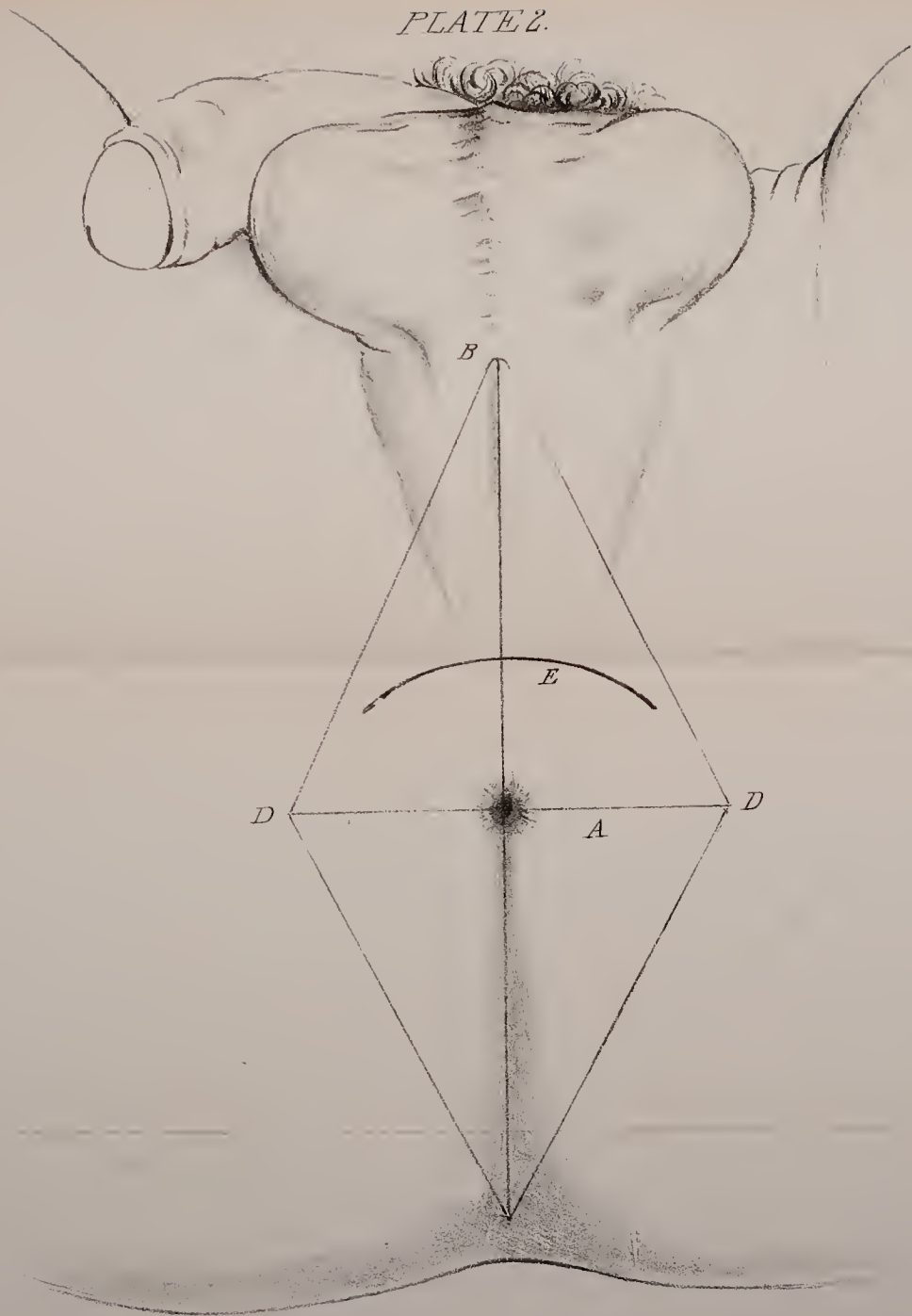
TRANSVERSE SECTION



SIDE VIEW.

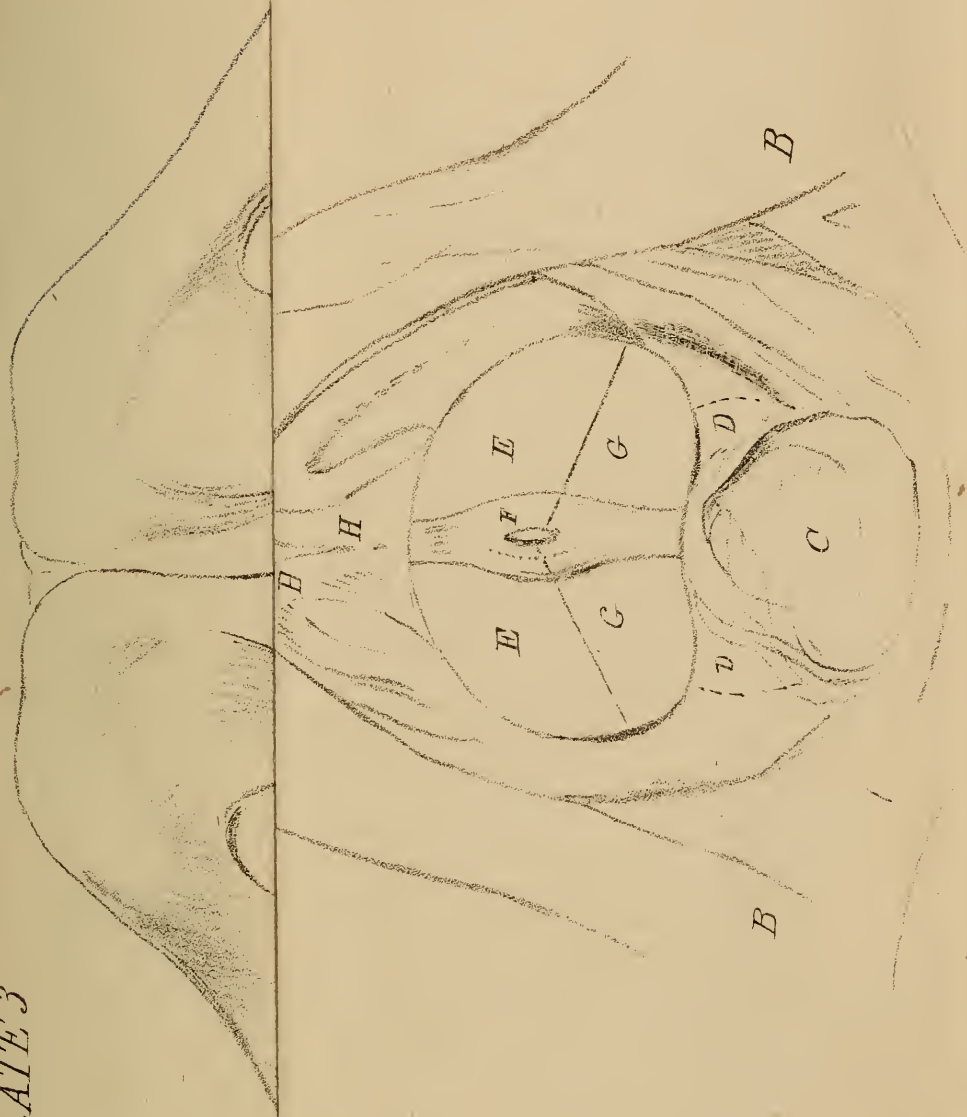




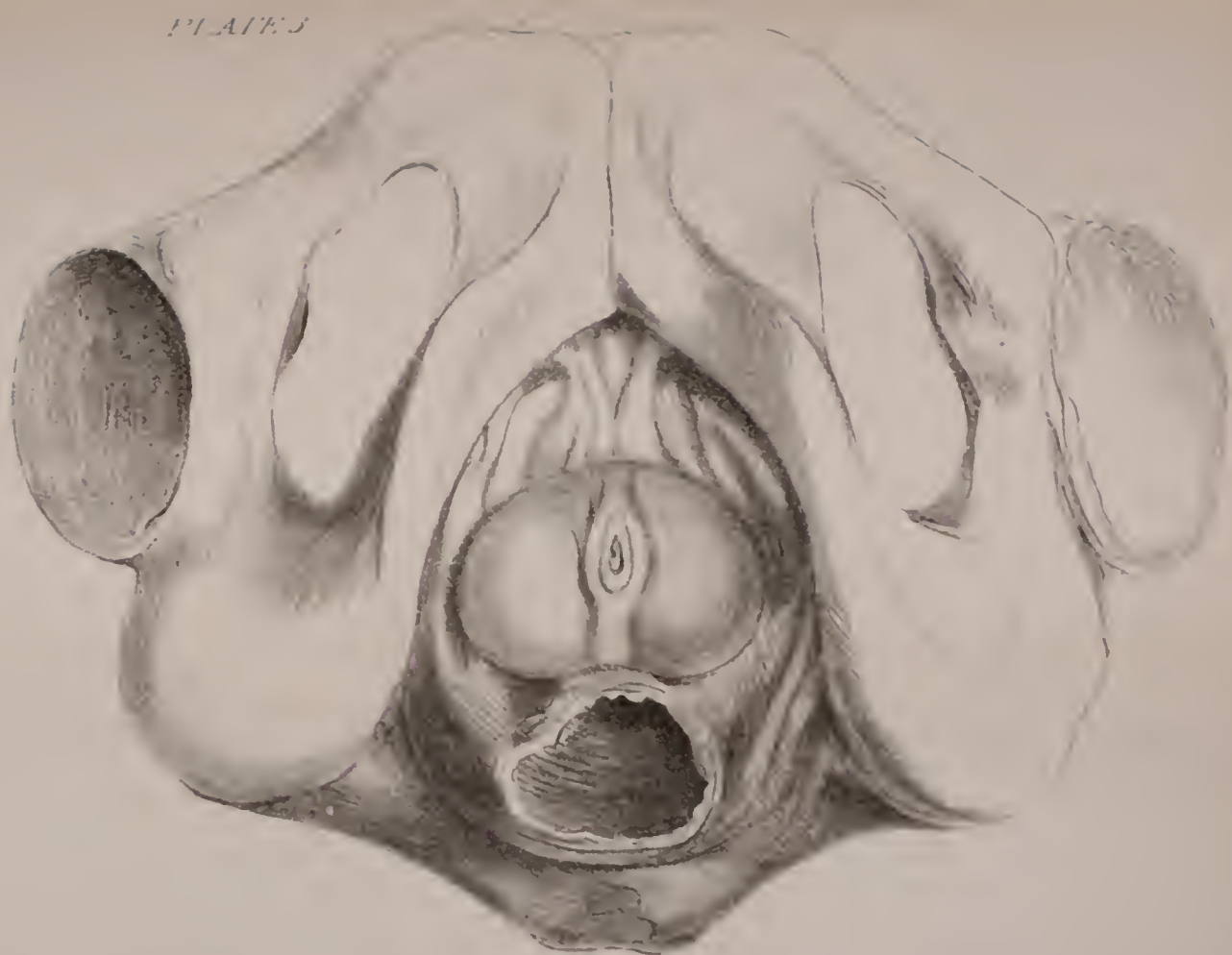






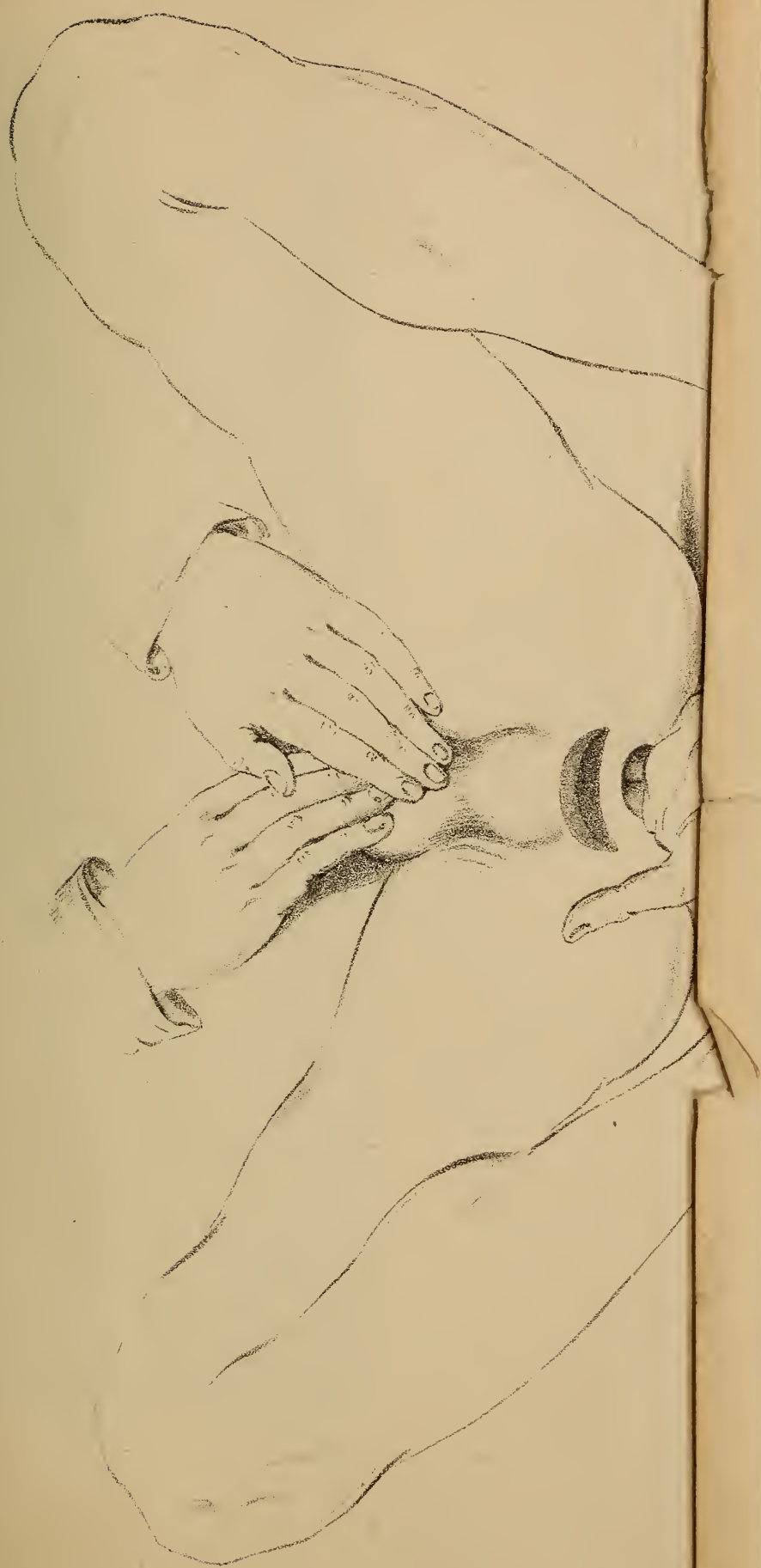
































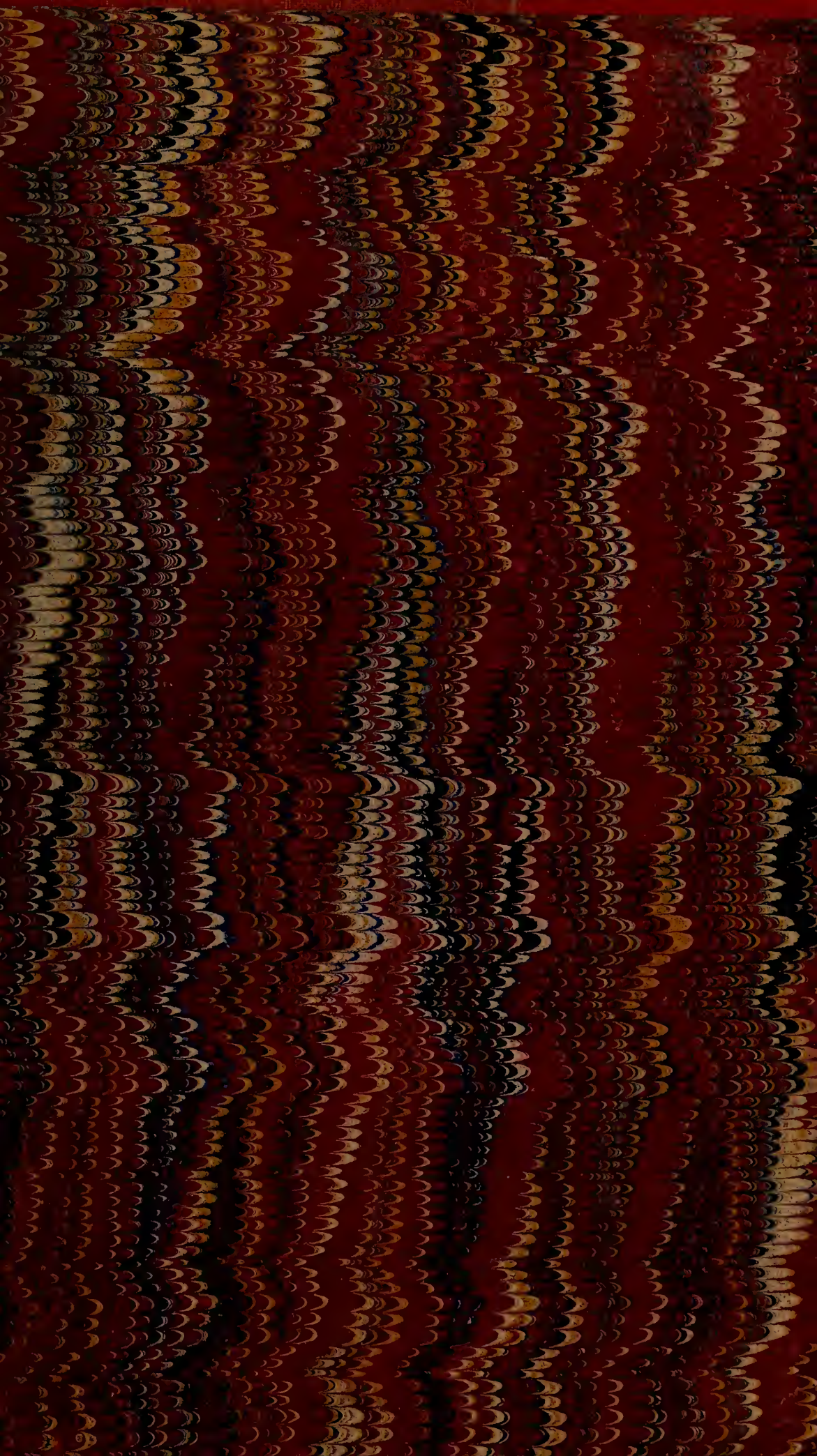












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